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# Montana Basin Outlook Report May 1, 1999



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# Basin Outlook Reports

## and

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#### *How forecasts are made*

Most of the annual streamflow in the Western United States originates as snowfall that has accumulated high in the mountains during winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Predictions are based on careful measurements of snow water equivalent at selected index points. Precipitation, temperature, soil moisture and antecedent streamflow data are combined with snowpack data to prepare runoff forecasts. Streamflow forecasts are coordinated by Natural Resources Conservation Service and National Weather Service hydrologists. This report presents a comprehensive picture of water supply conditions for areas dependent upon surface runoff. It includes selected streamflow forecasts, summarized snowpack and precipitation data, reservoir storage data, and narratives describing current conditions.

Snowpack data are obtained by using a combination of manual and automated SNOTEL measurement methods. Manual readings of snow depth and water equivalent are taken at locations called snow courses on a monthly or semi-monthly schedule during the winter. In addition, snow water equivalent, precipitation and temperature are monitored on a daily basis and transmitted via meteor burst telemetry to central data collection facilities. Both monthly and daily data are used to project snowmelt runoff.

Forecast uncertainty originates from two sources: (1) uncertainty of future hydrologic and climatic conditions, and (2) error in the forecasting procedure. To express the uncertainty in the most probable forecast, four additional forecasts are provided. The actual streamflow can be expected to exceed the most probable forecast 50% of the time. Similarly, the actual streamflow volume can be expected to exceed the 90% forecast volume 90% of the time. The same is true for the 70%, 30%, and 10% forecasts. Generally, the 90% and 70% forecasts reflect drier than normal hydrologic and climatic conditions; the 30% and 10% forecasts reflect wetter than normal conditions. As the forecast season progresses, a greater portion of the future hydrologic and climatic uncertainty will become known and the additional forecasts will move closer to the most probable forecast.

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United States Department of Agriculture  
Natural Resources Conservation Service (formerly the Soil Conservation Service)  
Bozeman, Montana

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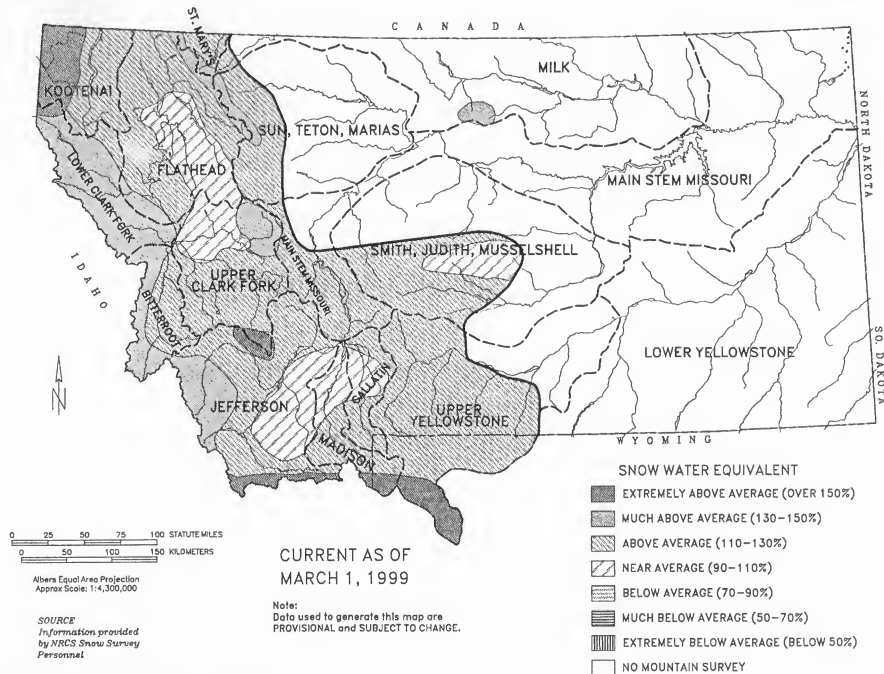
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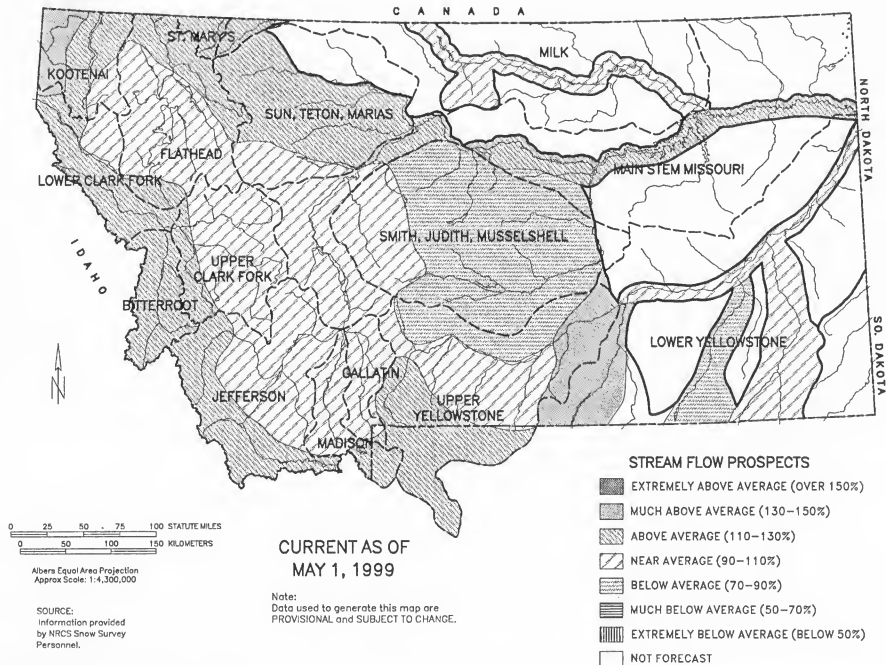
Shad Weber  
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## MOUNTAIN SNOWWATER EQUIVALENT FOR MONTANA

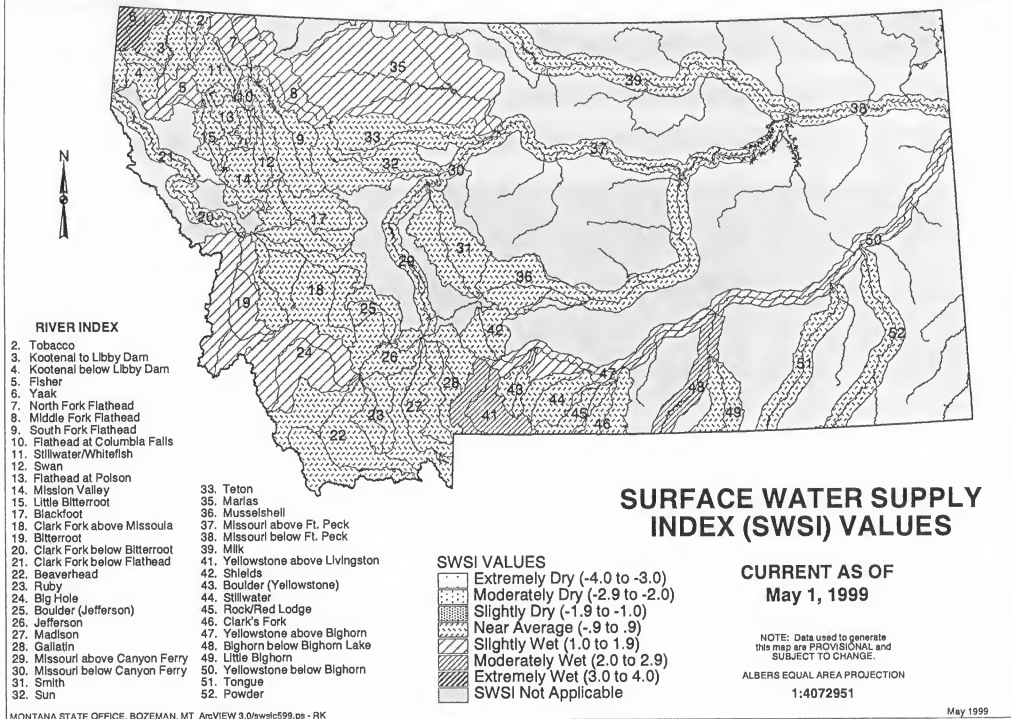














## SUMMARY OF MONTANA SNOTEL AND SNOW COURSE DATA

MAY 1999

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-90
ABE LINCOLN	4440	4/28/99	54	24.9	.0	--
ABUNDANCE LAKE	8800	4/30/99	66	26.7	21.8	22.6
ALBRO LAKE PILLOW	8300	5/01/99	---	22.4	17.8	23.9
AMBROSE	6480	5/02/99	32	14.0	9.4	12.1
ASHLEY LAKE	4000	4/27/99	0	.0	.0	1.2
ARCH FALLS	7350	4/28/99	33	12.6	11.6	13.7
ASHLEY DIVIDE	4820	4/27/99	1	.3	.0	1.0
BADGER PASS PILLOW	6900	5/01/99	---	47.0	20.6	37.8
BANFIELD MTN PILLOW	5600	5/01/99	---	23.9	8.4	18.3
BARREE CREEK	5500	4/29/99	121	58.8	31.2	43.0
BARREE MIDWAY	4600	4/29/99	100	46.4	20.8	29.4
BARREE TRAIL	3800	4/29/99	0	.0	.0	1.3
BARKER LAKES PILLOW	8250	5/01/99	---	18.3	12.7	16.0
BASIN CREEK PILLOW	7180	5/01/99	---	9.4	12.2	10.0
BASSOO PEAK	5150	4/27/99	10	3.6	.0	5.7
BEAGLE SPGS PILLOW	8850	5/01/99	---	15.6	9.3	8.8
BEAR BASIN	8150	4/27/99	45	19.0	20.8	22.0
BEAVER CREEK PILLOW	7850	5/01/99	---	20.2	18.7	20.5
BIG CREEK	6750	4/30/99	94	41.2	36.8	49.8
BIG SNOWY	7150	4/30/99	54	20.8	14.0	24.3
BISSON CREEK PILLOW	4920	5/01/99	---	3.7	3.7	2.5
BLACK BEAR PILLOW	7950	5/01/99	---	52.2	38.9	39.8
BLACK MOUNTAIN	7750	4/27/99	44	16.7	16.6	17.8
BLACK PINE PILLOW	7100	5/01/99	---	11.8	7.2	12.0
BLACKTAIL	5650	4/27/99	30	13.2	3.0	7.0
BLOODY DICK PILLOW	7550	5/01/99	---	13.0	10.1	10.5
BLUE LAKE	5900	4/25/99	62	29.8	7.9	23.9
BOTS SOTS	7750	4/29/99	32	9.3	5.1	8.1
BOULDER MTN PILLOW	7950	5/01/99	---	22.7	16.0	21.7
BOX CANYON PILLOW	6700	5/01/99	---	6.6	1.9	3.8
BOXELDER CREEK	5100	5/01/99	10	3.6	.0	2.2
BRACKETT CR PILLOW	7320	5/01/99	---	22.3	19.1	22.7
BRANHAM LAKES	8850	4/28/99	72	30.1	27.2	33.2
BRUSH CREEK TIMBER	5000	4/30/99	3	1.1	.0	6.0
BULL MOUNTAIN	6600	4/29/99	8	.8	.0	3.1
CABIN CREEK	5200	4/29/99	7	1.3	.0	1.9
CALL ROAD	8050	5/05/99	35	11.1	10.5	13.0
CALVERT CR PILLOW	6430	5/01/99	---	5.1	1.2	3.4
CAMP SENIA	7890	4/29/99	34	9.5	6.4	8.4
CARROT BASIN PILLOW	9000	5/01/99	---	35.5	28.4	31.2
CARTER CREEK	7400	4/29/99	25	7.6	9.0	--
CHESSMAN RESERVOIR	6200	4/28/99	2	.2	.0	2.4
CHICKEN CREEK	4060	4/29/99	29	11.9	.0	3.6

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-90
CLOVER MDW PILLOW	8800	5/01/99	---	20.7	18.9	19.0
COLE CREEK PILLOW	7850	5/01/99	---	18.6	15.6	20.6
COMBINATION PILLOW	5600	5/01/99	---	.0	.0	3.2
COPPER BOTTOM PILLOW	5200	5/01/99	---	7.1	.0	8.1
COPPER CAMP PILLOW	6950	5/01/99	---	42.1	12.3	35.3
COPPER MOUNTAIN	7700	4/27/99	27	9.6	10.8	10.6
COTTONWOOD CREEK	6400	4/30/99	27	8.1	8.5	7.6
COYTE HILL	4200	5/03/99	4	1.0	.0	3.0
CRYSTAL LAKE PILLOW	6050	5/01/99	---	7.9	2.4	10.9
DAD CREEK LAKE	8400	5/01/99	---	19.2E	18.5	16.6
DAISY PEAK	7600	5/03/99	26	9.8	6.4	8.7
DAISY PEAK PILLOW	7600	5/01/99	---	11.3	8.4	12.6
DAISY PEAK	7600	5/03/99	26	9.8	6.4	8.7
DALY CREEK PILLOW	5780	5/01/99	---	5.5	6.3	5.8
DARKHORSE LK. PILLOW	8700	5/01/99	---	34.6	28.6	35.3
DAVIS CREEK	5400	4/29/99	73	37.3	15.2	21.5
DEADMAN CR PILLOW	6450	5/01/99	---	5.3	4.7	6.9
DISCOVERY BASIN	7050	4/29/99	28	9.4	11.2	10.0
DIVIDE PILLOW	7800	5/01/99	---	11.7	11.4	12.1
DIX HILL	6400	5/02/99	0	.0	.0	4.4
DUPUYER CREEK PILLOW	5750	5/01/99	---	12.2	.7	8.5
EAST FORK R.S.	5400	5/02/99	0	.0	.0	.9
ELK HORN SPRINGS	7800	5/05/99	23	8.5	8.1	7.7
ELK PEAK	8000	4/29/99	49	18.4	14.4	19.2
EMERY CREEK PILLOW	4350	5/01/99	---	8.2	.3	8.5
FATTY CREEK	5500	4/30/99	55	21.9	16.8	23.6
FISH CREEK	8000	4/30/99	43	15.2	14.7	12.4
FISHER CREEK PILLOW	9100	5/01/99	---	39.6	28.3	38.7
FIVE-BULL	5700	4/30/99	10	2.1	.0	3.2
FLATTOP MTN PILLOW	6300	5/01/99	---	58.3	36.0	48.4
FLEECER RIDGE	7500	4/29/99	27	10.7	6.2	8.4
FOOLHEN	8280	4/30/99	44	17.5	17.8	18.2
FOUR MILE	6900	4/27/99	18	6.4	6.1	6.9
FOURTH OF JULY	3450	4/28/99	0	.0	.0	1.0
FREIGHT CREEK	6000	4/25/99	42	18.4	.0	13.2
FROHNER MDWS PILLOW	6480	5/01/99	---	6.8	5.2	7.1
GARVER CREEK PILLOW	4250	5/01/99	---	7.9	1.0	3.3
GARVER CREEK	4250	4/29/99	18	8.9	.0	4.0
GOAT MOUNTAIN	7000	4/30/99	26	8.9	1.2	8.6
GOLD STONE	8100	5/05/99	46	17.0	18.2	18.0
GRASSHOPPER	7000	4/29/99	9	2.8	4.0	4.6
GRAVE CRK PILLOW	4300	5/01/99	---	9.4	2.4	9.0
GRIFFIN CR DIVIDE	5150	4/26/99	9	3.4E	.0	6.3
HAND CREEK PILLOW	5030	5/01/99	---	6.3	.0	8.3
HAWKINS LAKE PILLOW	6450	5/01/99	---	41.0	16.2	30.4
HEBGEN DAM	6550	5/03/99	16	7.0	7.4	6.8
HELL ROARING DIVIDE	5770	4/29/99	69	30.1	19.6	30.1
HERRIG JUNCTION	4850	4/29/99	64	30.4	17.0	23.2
HOLBROOK	4530	5/01/99	---	.0E	.0	1.7
HOODOO BASIN PILLOW	6050	5/01/99	---	63.0	31.5	47.2

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-90
ICEBERG LAKE NO 3	5600	4/30/99	92	39.8	24.0	29.2
INDEPENDENCE	7850	4/29/99	44	19.1	11.3	17.0
INTERGAARD	6450	4/28/99	18	5.8	7.4	7.2
JOHNSON PARK	6450	5/04/99	0	.0	.0	2.3
JOSEPHINE LOWER NO 9	4900	4/29/99	53	23.7	10.4	15.1
KRAFT CREEK PILLOW	4750	5/01/99	---	5.3	.0	5.8
LAKE CREEK	6100	5/05/99	0	.0E	2.8	3.1
LAKEVIEW CANYON	6930	4/30/99	39	13.9	8.4	11.0
LAKEVIEW RDG. PILLOW	7400	5/01/99	---	15.3	9.5	9.2
LEMHI RIDGE PILLOW	8100	5/01/99	---	11.8	12.3	10.8
LICK CREEK PILLOW	6860	5/01/99	---	9.9	9.6	11.2
LITTLE PARK	7400	4/27/99	33	14.2	14.8	16.4
LOGAN CREEK	4300	4/28/99	3	1.0	.0	2.2
LONE MOUNTAIN PILLOW	8880	5/01/99	---	23.3	19.2	20.8
LOWER TWIN PILLOW	7900	5/01/99	---	19.6	17.7	21.9
LUBRECHT PILLOW	4680	5/01/99	---	.0	.0	1.7
LUBRECHT FOREST NO 3	5450	4/29/99	1	.4	.0	3.0
LUBRECHT FOREST NO 4	4650	4/29/99	0	.0	.0	.2
LUBRECHT FOREST NO 6	4040	4/29/99	0	.0	.0	.1
LUBRECHT HYDROPLT	4200	4/29/99	0	.0	.0	.1
MADISON PLT PILLOW	7750	5/01/99	---	36.1	20.2	23.8
MANY GLACIER PILLOW	4900	5/01/99	---	5.5	.0	8.0
MARTAS PASS	5250	4/27/99	38	17.9	3.2	14.4
MAYNARD CREEK	6210	4/27/99	35	14.0	11.2	15.2
MIDDLE MILL CREEK	7850	4/28/99	34	13.8	14.0	16.6
MILL CREEK	7500	4/27/99	26	11.2	9.0	11.0
MINERAL CREEK	4000	4/28/99	29	11.9	3.0	11.2
MONUMENT PK PILLOW	8850	5/01/99	---	28.4	19.7	23.8
MOSS PEAK PILLOW	6780	5/01/99	---	41.9	34.5	41.8
MOUNT ALLEN NO 7	5700	4/29/99	137	69.0	34.3	43.8
MT LOCKHART PILLOW	6400	5/01/99	---	27.5	13.9	21.9
MULE CREEK PILLOW	8300	5/01/99	---	19.6	16.4	17.0
NEVADA CREEK PILLOW	6480	5/01/99	---	17.9	9.4	12.5
NEVADA RIDGE PILLOW	7020	5/01/99	---	17.8	9.1	13.3
NEWTON MOUNTAIN	5600	4/28/99	106	50.9	25.3	35.4
NEZ PERCE CMP PILLOW	5650	5/01/99	---	13.5	8.0	11.7
NEZ PERCE CREEK	6600	4/27/99	6	2.0	2.1	3.4
NEZ PERCE PASS	6570	5/01/99	---	12.6E	12.4	15.6
NOISY BASIN PILLOW	6040	5/01/99	---	44.4	34.7	44.0
N.F. ELK CR PILLOW	6250	5/01/99	---	9.2	4.9	9.6
NF JOCKO PILLOW	6330	5/01/99	---	46.3	30.2	46.3
N.E. ENTRANCE PILLOW	7350	5/01/99	---	6.3	.0	5.9
NOTCH	8500	5/05/99	58	19.0	21.8	18.5
OPHIR PARK	7150	5/02/99	35	14.8	6.2	17.4
PETERSON MEADOWS	7200	4/29/99	33	10.7	11.0	11.0
PETERSON MDW PILLOW	7200	5/01/99	---	12.8	12.2	11.3
PICKFOOT CRK PILLOW	6650	5/01/99	---	3.7	1.3	4.8
PIEGAN PASS NO 6	5500	4/29/99	122	61.2	28.4	37.5
PIKE CREEK PILLOW	5930	5/01/99	---	33.2	12.1	27.8
PIPESTONE PASS	7200	4/28/99	21	7.0	7.4	5.0

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-90
PLACER BASIN PILLOW	8830	5/01/99	---	22.3	15.5	21.2
PORCUPINE PILLOW	6500	5/01/99	---	.5	.0	3.9
POTOMAGETON PARK	7150	5/03/99	19	8.6	8.6	9.4
PTARMIGAN	5800	4/30/99	102	46.1	25.2	36.2
RED MOUNTAIN	6000	4/28/99	45	22.0	10.9	17.5
RED TOP	5260	4/28/99	84	40.3	17.9	28.8
REVAIS CREEK	4800	4/28/99	0	.0	.0	.0
ROCK CREEK	5600	4/30/99	6	1.6	2.0	5.4
ROCK CREEK MEADOW	8160	4/27/99	60	22.7	17.3	24.2
ROCKER PEAK PILLOW	8000	5/01/99	---	15.6	15.1	17.7
ROCKY BOY PILLOW	4700	5/01/99	---	.0	.0	1.9
ROCKY BOY	4700	5/01/99	0	.0	.0	1.4
SACKJAWEA	6550	4/27/99	28	12.5	13.3	12.7
SADDLE MTN PILLOW	7900	5/01/99	---	28.7	22.6	27.6
SHORT CREEK PILLOW	7000	5/01/99	---	5.5	5.9	2.0
SHOWER FALLS PILLOW	8100	5/01/99	---	24.3	22.8	28.0
SKALKAHO PILLOW	7260	5/01/99	---	30.1	21.6	26.2
SLIDE ROCK MOUNTAIN	7100	5/01/99	---	19.8E	13.6	17.2
SMUGGLER MINE	6960	4/28/99	17	6.2	8.4	9.0
S.F. SHIELDS PILLOW	8100	5/01/99	---	20.2	14.9	19.1
SPOTTED BEAR MTN.	7000	4/25/99	22	9.6	.0	9.6
SPUR PARK PILLOW	8100	5/01/99	---	26.3	17.9	23.6
SLEEPING WOMAN PILL	6150	5/01/99	---	18.0	8.4	14.9
STAHL PEAK PILLOW	6030	5/01/99	---	44.5	33.2	36.5
STEMPLE PASS	6600	4/28/99	30	8.4	3.2	10.3
STORM LAKE	7780	4/29/99	48	16.6	15.0	15.0
STRYKER BASIN	6180	4/29/99	81	38.6	29.7	35.8
STUART MOUNTAIN	7400	4/30/99	82	37.8	27.6	32.3
STUART MOUNTAIN PILL	7400	5/01/99	---	39.8	26.0	30.4
SUCKER CREEK	3960	5/01/99	0	.0	.0	.3
TAYLOR ROAD	4080	5/01/99	0	.0	.0	.5
TEN MILE LOWER	6600	4/28/99	10	2.0	1.9	5.4
TEN MILE MIDDLE	6800	4/28/99	32	8.6	8.2	12.4
TEPEE CREEK PILLOW	8000	5/01/99	---	16.9	14.9	13.0
TIMBERLINE CREEK	8850	5/01/99	---	19.3E	12.8	17.8
TIZER BASIN PILLOW	6840	5/01/99	---	7.5	7.7	10.3
TRAIL CREEK	7090	5/05/99	16	4.5	7.4	6.3
TRINKUS LAKE	6100	4/25/99	94	46.0	27.4	43.1
TRUMAN CREEK	4060	4/27/99	0	.0	.0	.6
TV MOUNTAIN	6800	4/30/99	47	19.8	13.4	18.7
TWELVEMILE PILLOW	5600	5/01/99	---	10.2	.2	12.4
TWENTY-ONE MILE	7150	5/01/99	33	15.1	12.8	14.8
TWIN CREEKS	3580	4/25/99	7	2.9	.0	1.8
TWIN LAKES PILLOW	6400	5/01/99	---	51.8	29.3	39.8
UPPER HOLLAND LAKE	6200	4/25/99	80	37.8	24.8	35.2
WALDRON PILLOW	5600	5/01/99	---	11.8	2.3	6.5
WARM SPRINGS PILLOW	7800	5/01/99	---	24.9	21.2	24.9
WEASEL DIVIDE	5450	4/30/99	82	40.2	22.2	33.6
WEST YELLOWSTONE	6700	5/01/99	21	9.0	4.8	7.1



SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-90
WEST YELL'ST PILLOW	6700	5/01/99	---	7.2	1.6	6.8
WHISKEY CREEK PILLOW	6800	5/01/99	---	20.5	14.9	15.2
WHITE MILL PILLOW	8700	5/01/99	---	30.1	23.1	26.3
WHITE PINE RIDGE	8850	5/05/99	25	6.4	5.9	5.8
WILLOW CREEK	6500	4/29/99	14	3.6	.3	4.4
WOOD CREEK PILLOW	5960	5/01/99	---	11.2	5.7	8.6
WRONG CREEK	5700	4/28/99	22	8.3	.8	9.2
WRONG RIDGE	6800	4/28/99	48	17.8	8.6	18.6



# Montana Water Supply Outlook Report as of May 1, 1999

The most significant storms during April occurred in southwest and southcentral Montana and in the Wind River Mountains in Wyoming. April temperatures in western Montana averaged one to two degrees below normal, central Montana near normal, and eastern Montana one to three degrees above normal.

## Snowpack

Snowpack increases during April were the greatest in southwest and southcentral Montana and the Wind River Mountains in Wyoming, which is the headwaters to the Lower Yellowstone Basin in Montana. In the Wind Mountains there were record breaking snowpack increases and the snow water content increased significantly during major storms occurring the last two week of April. These storms have increased the snow water content to near the record of May 1, 1997. In Montana, mountain snow water contents were ranging from below to well above average and about 60 percent above last year at this time. Mountain snow water content was 113 percent of average and 157 percent of last year. West of the Continental Divide, snowpack was 116 percent of average and 180 percent of last year and East of the continental Divide, snowpack was 112 percent of average and 134 percent of last year. Snowpack extremes were the highest in the Yaak River Basin at 147 percent of average and 241 percent of last year, and the lowest in the Musselshell River Basin at 82 percent of average and 123 percent of last year.

RIVER BASIN	% OF AVERAGE	% OF LAST YEAR
COLUMBIA	116	180
KOOTENAI	139	219
FLATHEAD	108	173
UPPER CLARK FORK	102	144
BITTERROOT	114	165
LOWER CLARK FORK	134	207
MISSOURI	107	138
MISSOURI HEADWATERS	108	119
JEFFERSON	108	118
MADISON	115	128
GALLATIN	97	112
MISSOURI MAINSTEM	103	202
HEADWATERS MAINSTEM	95	142
SMITH-JUDITH-MUSSELSHELL	88	143
SUN-TETON-MARIAS	121	321
MAINSTEM ABOVE FT. PECK RES	105	204
MILK (Bearpaw Mtns.)	73	--
ST. MARY	138	196
ST. MARY & MILK	136	198
YELLOWSTONE	117	128
UPPER YELLOWSTONE	110	143
LOWER YELLOWSTONE (WYOMING)	125	123
WIND	157	141
SHOSHONE	127	149
BIGHORN	117	123
TONGUE	98	102
POWDER	105	95

NOTE: The Kootenai River Basin is the fourth highest of record and the Wind River Basin in the Lower Yellowstone is the second highest of record.

## Precipitation

April mountain and valley precipitation across the state was 82 percent of average and 93 percent of last year, while the water year precipitation was 108 percent of average and 129 percent of last year.

West of the Continental Divide, April mountain and valley precipitation was 54 percent of average and 62 percent of last year and the water year precipitation was 109 percent of average and 135 percent of last year. East of the Divide, April mountain and valley precipitation was 121 percent of average and 129 percent of last year and the water year precipitation was 110 percent of average and 124 percent of last year.

RIVER BASIN	APRIL % OF AVERAGE	WATER YEAR % OF AVERAGE
COLUMBIA	54	109
KOOTENAI	56	118
FLATHEAD	48	104
UPPER CLARK FORK	69	106
BITTERROOT	45	113
LOWER CLARK FORK	25	112
MISSOURI	93	104
JEFFERSON	96	104
MADISON	81	109
GALLATIN	72	94
MISSOURI MAINSTEM	94	96
SMITH-JUDITH-MUSSELSHELL	102	102
SUN-TETON-MARIAS	92	107
MILK	134	131
ST. MARY	59	107
YELLOWSTONE	161	119
UPPER YELLOWSTONE	111	109
LOWER YELLOWSTONE (WYOMING)	202	133
WIND	294	141
SHOSHONE	156	132
BIGHORN	157	125
TONGUE	181	108
POWDER	253	140

## Reservoirs

Major reservoir storage statewide was 92 percent of average and 78 percent of last year.

Reservoir storage west of the Continental Divide was 88 percent of average and 71 percent of last year. East of the Continental Divide, reservoir storages were 80 percent of average and 98 percent of last year.

RIVER BASIN	% OF AVERAGE	% OF LAST YEAR
COLUMBIA	88	71
KOOTENAI	72	51
FLATHEAD	97	86
UPPER CLARK FORK	93	73
BITTERROOT	83	72
LOWER CLARK FORK	155	119
MISSOURI	98	89
JEFFERSON	106	93
MADISON	93	88
GALLATIN	165	104
MISSOURI MAINSTEM	92	87
SMITH-JUDITH-MUSSELSHELL	114	88
SUN-TETON-MARIAS	110	91
MILK	76	82
ST. MARY	50	125
YELLOWSTONE	97	95
UPPER YELLOWSTONE	103	90
LOWER YELLOWSTONE	97	95

## Streamflow

### SEASONAL STREAMFLOW FORECASTS

Statewide, streamflows are forecast to range between 96 and 124 percent of average. West of the Continental Divide, streamflows are forecast to range between 103 and 121 percent of average and east of the Continental Divide, streamflows are forecast to range between 90 and 127 percent of average.

Below are River Basin streamflow forecast summaries for the period May 1 through July 31. THESE FORECASTS ASSUME NEAR NORMAL SPRING CONDITIONS AND DO NOT ACCOUNT FOR WELL BELOW AVERAGE (70% or less) OR WELL ABOVE AVERAGE (130% or more) SNOWMELT OR SPRING RAIN. Specific forecast probabilities are available in each individual River Basin Report.

RIVER BASIN	May-July THIS YEAR		May-July LAST YEAR	
	% OF AVERAGE		% OF AVERAGE	
COLUMBIA .....	103	to 121	55	to 67
KOOTENAI .....	106	to 123	45	to 55
FLATHEAD .....	102	to 114	60	to 69
UPPER CLARK FORK .....	94	to 123	61	to 70
BITTERROOT .....	106	to 126	61	to 76
LOWER CLARK FORK .....	105	to 119	48	to 64
MISSOURI .....	93	to 126	62	to 88
JEFFERSON .....	80	to 136	71	to 103
MADISON .....	112	to 124	78	to 90
GALLATIN .....	86	to 103	79	to 95
MISSOURI MAINSTEM .....	93	to 131	55	to 92
SMITH-JUDITH-MUSSELSHELL ..	84	to 126	47	to 78
SUN-TETON-MARIAS .....	104	to 139	41	to 71
MILK .....	85	to 137	13	to 60
ST. MARY .....	102	to 115	67	to 75
YELLOWSTONE .....	93	to 118	78	to 100
UPPER YELLOWSTONE .....	99	to 118	75	to 93
LOWER YELLOWSTONE .....	97	to 125	80	to 107

NOTE: The MAY-JULY LAST YEAR % OF AVERAGE column above is last years forecasts on May 1, NOT of what actually occurred.

# Peak Streamflow Forecasts

## WATERSHED

## SNOWMELT PEAK FLOW DATES

### COLUMBIA RIVER

Fisher and Yaak Rivers .....	May 11 to May 17
North Fork Flathead River near Columbia Falls .....	May 28 to June 3
Middle Fork Flathead River near West Glacier .....	May 26 to June 1
Hungry Horse Reservoir inflow .....	May 28 to June 3
Lower Willow and Nevada CK. Res. inflow ..	May 15 to May 22
Swan River .....	May 29 to June 4
Blackfoot River near Bonner .....	May 25 to June 4
Clark Fork above Missoula .....	May 29 to June 5
Clark Fork below Missoula .....	June 1 to June 7
Bitterroot River near Darby .....	May 26 to June 3
Middle Fork Rock Creek .....	June 3 to June 9

### MISSOURI RIVER

Clark Canyon Res. inflow .....	May 29 to June 4
Ruby Res. inflow .....	May 28 to June 10
Big Hole near Melrose .....	May 28 to June 3
Hebgen Res. inflow .....	May 31 to June 6
Gallatin River .....	June 3 to June 9
Missouri at Toston .....	June 2 to June 8
Sheep Creek near White Sulphur Springs ..	May 19 to May 26
Smith River near Eagle Creek .....	June 6 to June 12
Gibson Reservoir inflow .....	June 2 to June 10
Swift Reservoir inflow .....	June 4 to June 10

### YELLOWSTONE RIVER

All forecast stations above Billings.....	June 8 to June 16
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PEAK STREAMFLOW FORECASTS FOR UNREGULATED STREAMS ARE AS FOLLOWS:

	PEAK RANGE IN DAILY CFS	PEAK RANGE AS PERCENT OF AVERAGE	AVERAGE DAILY PEAK IN CFS
COLUMBIA RIVER			
Fisher near Libby.....	2,250 to 3,350 .....	91 to 136 .....	2,466
Yaak near Troy.....	8,000 to 11,800 .....	133 to 196 .....	6,021
Blackfoot near Bonner...	8,400 to 11,900 .....	88 to 124 .....	9,588
Clark Fork ab Missoula ..	15,750 to 22,750 .....	94 to 136 .....	16,738
Bitterroot near Darby ..	5,500 to 8,000 .....	88 to 128 .....	6,229
Clark Fork blv Missoula ..	30,000 to 42,000 .....	94 to 131 .....	31,992
Clark Fork at St. Regis ..	37,000 to 52,000 .....	92 to 130 .....	39,984
North Fork Flathead near Columbia Falls .....	19,000 to 26,000 .....	90 to 123 .....	21,189
Middle Fork Flathead near West Glacier .....	18,250 to 24,000 .....	81 to 107 .....	22,463
Hungry Horse Res Inflow ..	23,600 to 29,100 .....	83 to 102 .....	28,600
Swan at Big Fork.....	3,900 to 6,000 .....	75 to 115 .....	5,228
Nevada Creek near Pinn.....	150 to 340 .....	45 to 102 .....	334
Middle Fork Rock Creek near Philipsburg.....	740 to 900 .....	87 to 106 .....	853
MISSOURI RIVER			
Big Hole near Melrose ..	7,200 to 10,300 .....	90 to 129 .....	8,015
Inflow Clark Canyon Dam ..	1,100 to 1,950 .....	-- to -- .....	-----
Inflow Ruby Reservoir ..	560 to 980 .....	54 to 95 .....	1,037
Inflow Hebgen Reservoir ..	3,900 to 4,850 .....	113 to 141 .....	3,442
Gallatin near Gateway ..	4,700 to 5,900 .....	87 to 109 .....	5,389
Gallatin near Logan ....	4,100 to 5,900 .....	73 to 106 .....	5,581
Missouri at Toston .....	17,500 to 25,000 .....	92 to 131 .....	19,042
Marias near Shelby .....	5,500 to 9,000 .....	48 to 78 .....	11,516
Inflow Gibson Reservoir ..	6,600 to 8,300 .....	-- to -- .....	-----
Inflow Swift Reservoir ..	790 to 1,080 .....	-- to -- .....	-----
Sheep Creek near White Sulphur Springs.....	160 to 235 .....	75 to 111 .....	212
S. Fk. Musselshell above Martinsdale .....	490 to 820 .....	40 to 67 .....	1,229
YELLOWSTONE RIVER			
Yellowstone at Corwin Springs .....	18,500 to 24,500 .....	105 to 140 .....	17,532
Yellowstone at Livingston .....	21,000 to 27,500 .....	102 to 133 .....	20,732
Boulder near Big Timber ..	4,300 to 6,300 .....	82 to 121 .....	5,226
Stillwater nr Absarokee ..	4,800 to 7,500 .....	73 to 114 .....	6,601
Clarks Fork near Belfry ..	6,500 to 9,200 .....	84 to 119 .....	7,706
Yellowstone at Billings ..	36,000 to 50,500 .....	84 to 118 .....	42,716

NOTE: The low number in the flow range represents the maximum daily flow that would be expected to occur with little rainfall during the peak snowmelt period. The high number in the flow range could be expected with moderate amounts of rain about the same time as maximum snowmelt runoff is occurring.

# Surface Water Supply Index

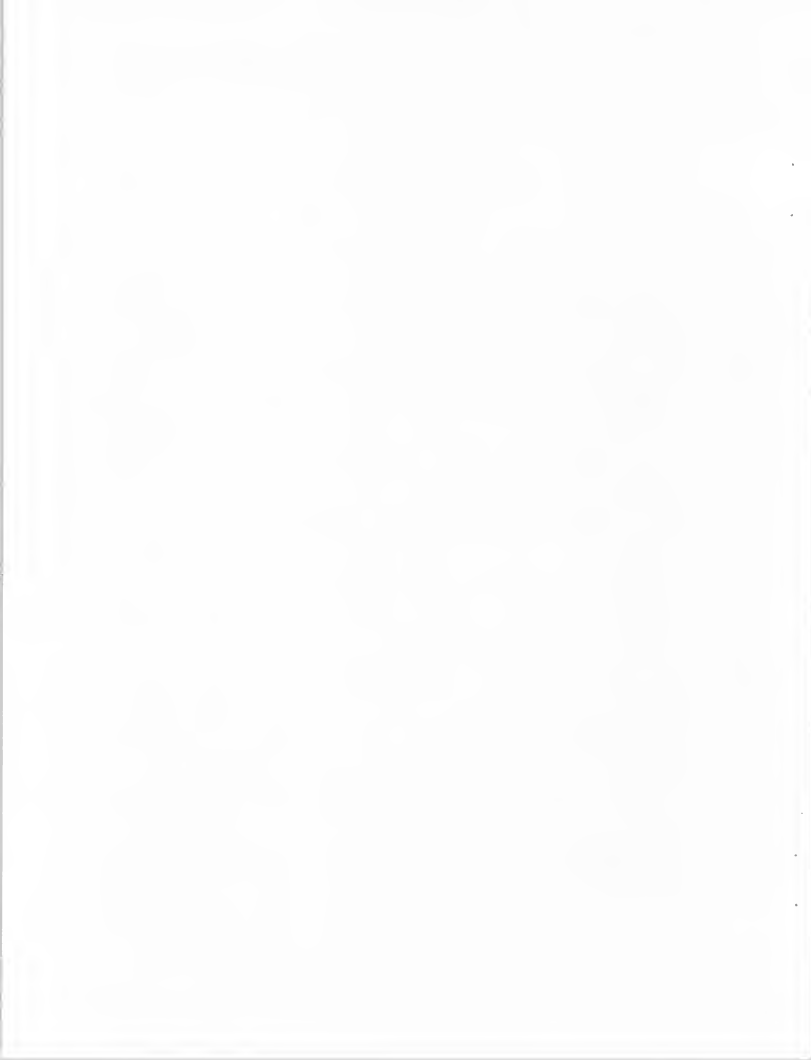
The Surface Water Supply Index (SWSI) is an indicator of surface water supply conditions for the spring and summer months. Water users that rely on mountain precipitation can use the index to evaluate seasonal surface water supplies. The SWSI accounts for mountain snowpack, mountain precipitation, streamflow, reservoir storage, and soil moisture.

SWSI RATING	SURFACE WATER CONDITION
+3.0 to +4.0	Extremely Wet
+2.0 to +3.0	Moderately Wet
+1.0 to +2.0	Slightly Wet
-1.0 to +1.0	Near Average
-1.0 to -2.0	Slightly Dry
-2.0 to -3.0	Moderately Dry
-3.0 to -4.0	Extremely Dry

## SWSI

## Basin

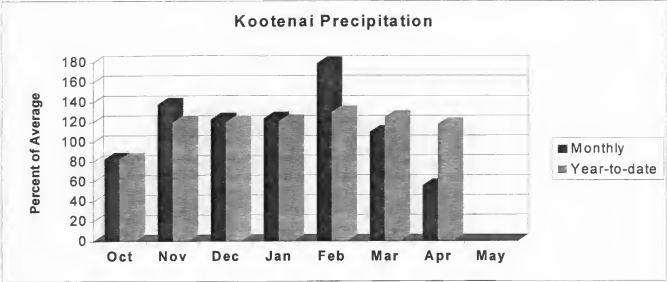
SWSI	Basin
+0.6	Kootenai River at Ft. Steele (Kootenai in Canada)
+0.9	Tobacco River
+0.6	Kootenai Ft. Steele to Libby Dam
+0.3	Kootenai River below Libby Dam
+1.1	Fisher River
+3.0	Yaak River
+1.1	North Fork Flathead River
+1.1	Middle FORK Flathead River
+0.3	South Fork Flathead River
+0.8	Flathead River at Columbia Falls
+0.6	Stillwater/Whitefish Rivers
-0.3	Swan River
+0.5	Flathead River at Polson
-0.2	Mission Valley
-0.8	Little Bitterroot River
+0.7	Clark Fork River above Rock Creek
+0.6	Blackfoot River
+0.6	Clark Fork River above Missoula
+1.0	Bitterroot River
+0.7	Clark Fork River below Bitterroot River
+0.6	Clark Fork River below Flathead River
+0.7	Beaverhead River
-0.7	Ruby River
+1.0	Big Hole River
-0.3	Boulder River (Jefferson)
+0.7	Jefferson River
+0.3	Madison River
-0.6	Gallatin River
+0.3	Missouri River above Canyon Ferry
-0.2	Missouri River below Canyon Ferry
+0.9	Smith River
+0.1	Sun River
+0.8	Teton River
+1.7	Birch/Dupuyer Creeks
+1.9	Marias River
+0.7	Musselshell River
+0.1	Missouri River above Ft. Peck
+0.3	Missouri River below Ft. Peck
-0.7	Milk River
+2.0	Yellowstone River above Livingston
-0.9	Shields River
+0.4	Boulder River (Yellowstone)
+0.4	Stillwater River
-0.5	Rock/Red Lodge Creeks
+0.4	Clarks Fork River
+1.3	Yellowstone River above Bighorn River
+2.7	Bighorn River below Bighorn Lake
-0.6	Little Bighorn River
+1.9	Yellowstone River below Bighorn River
-0.5	Tongue River
+0.1	Powder River





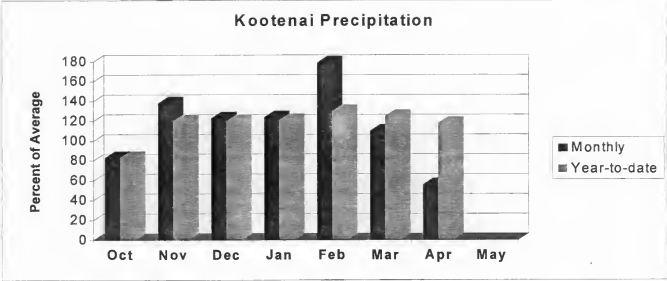
### Kootenai River Basin in Montana

Snowpack conditions in the Kootenai River Basin were well above average. Snow water content was 139 percent of average and 219 percent of last year. This is the fourth highest year of record for the period 1973 through 1998.



January maximum swe was established in 1997 and minimum was in 1977; February maximum swe was in 1997 and minimum swe was in 1977; March maximum swe was in 1972 and minimum swe was in 1977; April maximum swe was in 1974 and minimum swe was in 1977; May maximum swe was in 1974 and minimum swe was in 1977; and June maximum swe was in 1974 and minimum swe was in 1992. Average is for the period 1961 through 1990.

Mountain precipitation during April was 60 percent of average and 94 percent of last year. Valley precipitation during April was 36 percent of average and 36 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 118 percent of average and 151 percent of last year.



Lake Koocanusa storage was 72 percent of average and 51 percent of last year.

The Fisher River near Libby is forecast to reach snow melt peak flows between May 11 and May 17 with daily peak flows ranging from 2,250 cfs to 3,350 cfs or 91 to 136 percent of average and the Yaak River near Troy is forecast to reach snow melt peak flows between May 11 and May 17 with daily peak flows ranging from 8,000 to 11,800 cfs or 133 to 196 percent of average.

Surface Water Supply Index (SWSI) was +0.6 in the Kootenai at Ft. Steele (Kootenai in Canada); +0.9 in the Tobacco River; +0.6 in the Kootenai Ft. Steele to Libby Dam; +0.3 in the Kootenai River below Libby Dam; +1.1 in the Fisher River; and +3.0 in the Yaak River.

KOOTENAI RIVER BASIN in Montana  
Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<<----- Drier -----		Future Conditions		----- Wetter ----->>		30-Yr Avg. (1000AF)
		90%	70%	50% (Most Probable)		30%	10%	
		(1000AF)	(1000AF)	(1000AF)	(% AVG.)	(1000AF)	(1000AF)	
TOBACCO RIVER nr Eureka	MAY-JUL	95	113	125	114	137	155	110
	MAY-SEP	105	126	140	113	154	175	124
LIBBY Reservoir Inflow (1,2)	MAY-JUL	4595	5245	5540	105	5835	6485	5301
	MAY-SEP	5478	6250	6600	105	6950	7722	6294
FISHER RIVER nr Libby	MAY-JUL	117	147	167	103	187	217	163
	MAY-SEP	130	162	184	103	206	238	179
YAAK RIVER nr Troy	MAY-JUL	464	509	540	145	571	616	372
	MAY-SEP	485	533	565	143	597	645	394
KOOTENAI at Leona (1,2)	MAY-JUL	5566	6360	6720	105	7080	7874	6390
	MAY-SEP	6513	7439	7860	105	8281	9207	7466

KOOTENAI RIVER BASIN in Montana Reservoir Storage (1000 AF) - End of April					KOOTENAI RIVER BASIN in Montana Watershed Snowpack Analysis - May 1, 1999			
Reservoir	Capacity	Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
LAKE KOOCANUSA	5748.0	1725.0	3355.0	2409.0	KOOTENAY in CANADA	24	177	122
					KOOTENAI MAINTSTEM	3	239	151
					TOBACCO	3	163	119
					FISHER	5	217	128
					YAAK	8	241	147
					KOOTENAI in MONTANA	18	219	139
					KOOTENAI ab BONNERS FERRY	42	197	130

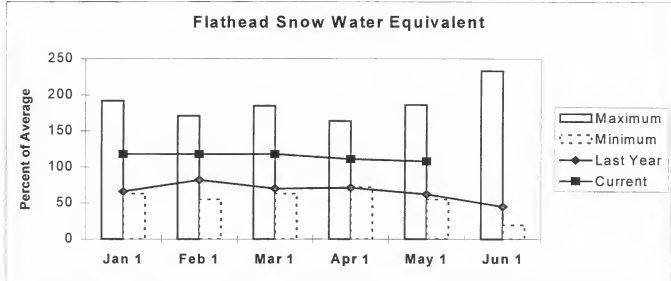
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.

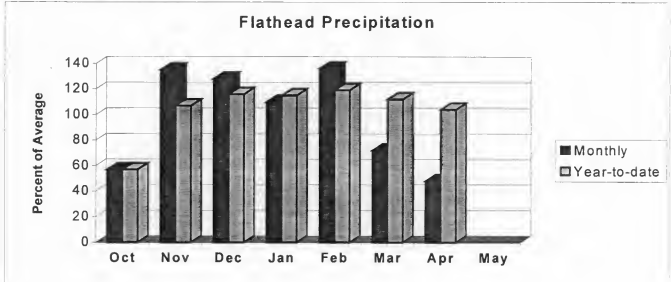
# Flathead River Basin

Snowpack conditions in the Flathead River Basin were near average. Snow water content was 108 percent of average and 173 percent of last year.



January maximum swe was established in 1997 and minimum was in 1988; February maximum swe was in 1972 and minimum was in 1977; March maximum swe was in 1972 and minimum was in 1977; April maximum swe was in 1972 and minimum was in 1992; May maximum swe was in 1972 and minimum was in 1992; and June maximum swe was in 1974 and minimum was in 1992. Average is for the period 1961 through 1990.

Mountain precipitation during April was 48 percent of average and 61 percent of last year. Valley precipitation during April was 38 percent of average and 30 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 104 percent of average and 128 percent of last year.



Combined Camas reservoir storage was 148 percent of average and 109 percent of last year; combined Mission Valley reservoir storage was 51 percent of average and 59 percent of last year; Hungry Horse storage was 98 percent of average and 79 percent of last year; and Flathead Lake storage was 94 percent of average and 107 percent of last year.

The North Fork Flathead near Columbia Falls is forecast to reach snow melt peak flows between May 28 and June 3 with daily peak flows ranging from 19,000 cfs to 126,000 cfs or 90 to 123 percent of average; the Middle Fork Flathead near West Glacier is forecast to reach snow melt peak flows between May 26 and June 1 with daily peak flows ranging from 18,250 cfs to 24,000 cfs or 81 to 107 percent of average; inflow to Hungry Horse Reservoir is forecast to reach snow melt peak flows between May 28 and June 3 with daily peak flows ranging from 23,600 to 29,100 or 83 to 102 percent of average; and the Swan near Big Fork is forecast to reach snow melt peak flows between May 29 and June 4 with daily peak flows ranging from 39,00 cfs to 6,000 cfs or 75 to 115 percent of average.

Surface Water Supply Index (SWSI) was +1.1 in the North Fork Flathead River; +1.1 in the Middle Fork Flathead River; +0.3 in the South Fork Flathead River; +0.8 in the Flathead River at Columbia Falls; +0.6 in the Stillwater/Whitefish Rivers; -0.3 in the Swan River; +0.5 in the Flathead River at Polson; -0.2 in the Mission Valley; and -0.8 in the Little Bitterroot River.

FLATHEAD RIVER BASIN  
Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<<----- Drier ----->>>>		Future Conditions		>>>> Wetter <<<<		30-Yr Avg. (1000AF)
		90%	70%	50% (Most Probable)		30%	10%	
		(1000AF)	(1000AF)	(1000AF) (% AVG.)		(1000AF)	(1000AF)	
NF FLATHEAD nr Columbia Falls	MAY-JUL	1441	1571	1660	113	1749	1879	1474
	MAY-SEP	1614	1761	1860	113	1959	2106	1648
MF FLATHEAD nr West Glacier	MAY-JUL	1470	1577	1650	114	1723	1830	1454
	MAY-SEP	1627	1748	1830	114	1912	2033	1604
HUNGRY HORSE Reservoir Inflow (1,2)	MAY-JUL	1610	1830	1930	109	2030	2250	1777
	MAY-SEP	1737	1966	2070	108	2174	2403	1911
FLATHEAD at Columbia Falls (1,2)	MAY-JUL	4469	5109	5400	112	5691	6331	4816
	MAY-SEP	4873	5586	5910	112	6234	6947	5294
STILLWATER nr Whitefish	MAY-JUL	114	141	160	103	179	206	155
	MAY-SEP	128	159	180	103	201	232	174
WHITEFISH nr Kalispell	MAY-JUL	74	86	94	102	102	114	92
	MAY-SEP	83	97	107	102	117	131	105
SWAN RIVER nr Bigfork	MAY-JUL	419	452	475	97	498	531	491
	MAY-SEP	484	526	555	97	584	626	574
FLATHEAD Lake Inflow (1,2)	MAY-JUL	5579	6089	6320	113	6551	7061	5578
	MAY-SEP	5980	6620	6910	113	7200	7840	6114

FLATHEAD RIVER BASIN Reservoir Storage (1000 AF) - End of April					FLATHEAD RIVER BASIN Watershed Snowpack Analysis - May 1, 1999			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
CAMAS (4)	45.2	42.1	38.6	28.5	NF FLATHEAD in CANADA	3	194	136
MISSION VALLEY (8)	100.0	25.3	42.8	49.7	NF FLATHEAD in MONTANA	8	173	115
HUNGRY HORSE	3451.0	2009.0	2551.0	2043.0	MIDDLE FORK FLATHEAD	5	228	120
FLATHEAD LAKE	1791.0	884.6	829.3	937.2	SOUTH FORK FLATHEAD	7	171	103
					STILLWATER-WHITEFISH	10	186	105
					SWAN	8	139	98
					MISSION VALLEY	5	129	98
					LITTLE BITTERROOT-ASHLEY	6	683	94
					JOCKO	5	159	112
					FLATHEAD in MONTANA	39	173	108
					FLATHEAD RIVER BASIN	42	174	109

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

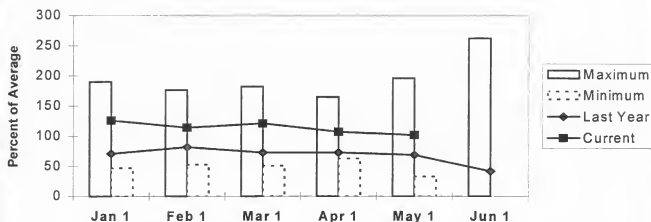
The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
 (2) - The value is natural volume - actual volume may be affected by upstream water management.

## Upper Clark Fork River Basin

Snowpack conditions in the Upper Clark Fork River Basin were near average. Snow water content was 102 percent of average and 144 percent of last year.

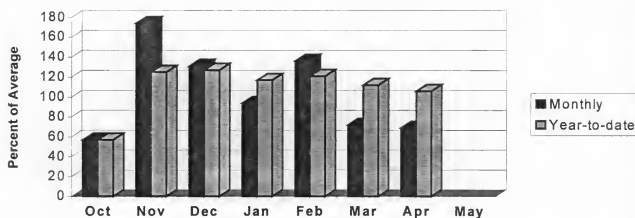
### Upper Clark Fork Snow Water Equivalent



January maximum swe was established in 1997 and minimum swe was in 1977; February maximum was in 1972 and minimum swe was in 1977; March maximum swe was in 1972 and minimum swe was in 1977; April maximum swe was in 1972 and minimum swe was in 1994; May maximum swe was in 1972 and minimum swe was in 1977; and June maximum swe was in 1975 and minimum swe was in 1987. Average is for the period 1961 through 1990.

Mountain precipitation during April was 70 percent of average and 72 percent of last year. Valley precipitation during April was 60 percent of average and 84 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 106 percent of average and 132 percent of last year.

### Upper Clark Fork Precipitation



Lower Willow Creek storage was 106 percent of average and 71 percent of last year; and Nevada Creek storage was 89 percent of average and 74 percent of last year.

The Blackfoot near Bonner is forecast to reach snow melt peak flows between May 25 and June 4 with daily peak flows ranging from 8,400 cfs to 11,900 cfs or 88 to 124 percent of average; the Clark Fork above Missoula is forecast to reach snow melt peak flows between May 29 and June 5 with daily peak flows ranging from 15,750 cfs to 22,750 cfs or 94 to 136 percent of average; inflow into Lower Willow Creek Reservoir is forecast to reach snow melt peak flows between May 15 and May 22; Nevada Creek near Finn is forecast to reach snow melt peak flows between May 15 and May 22 with daily peak flows ranging from 150 cfs to 340 cfs or 45 to 102 percent of average; and Middle Fork Rock Creek near Phillipsburg is forecast to reach snow melt peak flows between June 3 and June 9 with daily peak flows ranging from 740 cfs to 900 cfs or 87 to 106 percent of average.

Surface Water Supply Index (SWSI) was +0.7 in the Clark Fork River above Rock Creek; +0.6 in the Blackfoot River; and +0.6 in the Clark Fork River above Missoula.

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UPPER CLARK FORK RIVER BASIN  
Streamflow Forecasts - May 1, 1999

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Forecast Point	Forecast Period	<<----- Drier ----->>		Future Conditions		----->> Wetter ----->>		30-Yr Avg. (1000AF)
		90%	70%	Chance Of Exceeding *		30%	10%	
		(1000AF)	(1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	(1000AF)	(1000AF)	
WARM SPRINGS CK at Anaconda (D)	MAY-JUL	26	33	38	106	43	50	36
	MAY-SEP	34	42	47	107	52	60	44
LITTLE BLACKFOOT nr Garrison	MAY-JUL	30	51	65	94	79	100	69
	MAY-SEP	26	52	70	92	88	114	76
FLINT CREEK nr Southern Cross	MAY-JUL	7.5	10.7	12.9	107	15.1	18.3	12.1
	MAY-SEP	8.6	12.7	15.5	105	18.3	22	14.7
FLINT CREEK blw Boulder Ck	MAY-JUL	32	46	55	110	64	78	50
	MAY-SEP	46	62	73	111	84	100	66
LOWER WILLOW CK Reservoir Inflow	MAY-JUL	6.6	9.5	11.5	101	13.5	16.4	11.4
	MAY-SEP	6.7	10.0	12.3	100	14.6	17.9	12.3
MF ROCK CREEK nr Philipsburg	MAY-JUL	58	68	74	119	80	90	62
	MAY-SEP	65	75	82	119	89	99	69
ROCK CREEK nr Clinton	MAY-JUL	232	276	305	116	334	378	264
	MAY-SEP	266	313	345	115	377	424	300
NEVADA CREEK nr Finn	MAY-JUL	8.1	12.0	14.6	96	17.2	21	15.2
	MAY-SEP	9.5	13.6	16.3	96	19.0	23	16.9
CLEARWATER nr Clearwater	MAY-JUL	100	119	132	99	145	164	133
	MAY-SEP	106	126	140	99	154	174	142
BLACKFOOT RIVER nr Bonner	MAY-JUL	637	743	815	114	887	993	714
	MAY-SEP	728	842	920	114	998	1112	805
CLARK FORK abv Milltown	MAY-JUL	392	528	620	113	712	848	549
	MAY-SEP	480	632	735	113	838	990	652
CLARK FORK abv Missoula	MAY-JUL	1161	1327	1440	114	1553	1719	1263
	MAY-SEP	1363	1540	1660	114	1780	1957	1457

UPPER CLARK FORK RIVER BASIN Reservoir Storage (1000 AF) - End of April					UPPER CLARK FORK RIVER BASIN Watershed Snowpack Analysis - May 1, 1999			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
GEORGETOWN LAKE		NO REPORT			CLARK FORK ab FLINT CREEK	14	129	94
LOWER WILLOW CREEK	4.9	3.5	4.9	3.3	FLINT CREEK	6	106	96
NEVADA CREEK	12.6	9.1	12.3	10.2	ROCK CREEK	5	130	114
					CLARK FORK ab BLACKFOOT	22	128	99
					BLACKFOOT	16	202	105
					UPPER CLARK FORK BASIN	35	146	101

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\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

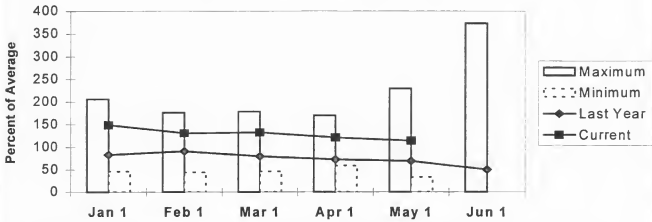
The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
 (2) - The value is natural volume - actual volume may be affected by upstream water management.

**Bitterroot River Basin**

Snowpack conditions in the Bitterroot River Basin were above average. Snow water content was 114 percent of average and 165 percent of last year.

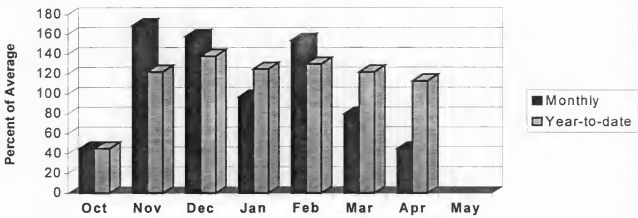
**Bitterroot Snow Water Equivalent**



January maximum swe was established in 1997 and minimum swe in 1977; February maximum swe was in 1972 and minimum was in 1977; March maximum swe was in 1972 and minimum swe was in 1977; April maximum swe was in 1972 and minimum swe was in 1977; May maximum swe was in 1972 and minimum swe was in 1987; and June maximum swe was 1972 and 1974 and minimum swe was in 1987 and 1992. Average is for the period 1961 through 1990.

Mountain precipitation during April was 46 percent of average and 43 percent of last year. Valley precipitation during April was 41 percent of average and 20 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 113 percent of average and 126 percent of last year.

**Bitterroot Precipitation**



Painted Rocks Lake storage was 81 percent of average and 78 percent of last year and Como storage was 86 percent of average and 67 percent of last year.

The Bitterroot near Darby is forecast to reach snow melt peak flows between May 26 and June 3 with daily peak flows ranging from 5,500 cfs to 8,000 cfs or 88 to 128 percent of average.

Surface Water Supply Index (SWSI) was +1.0 in the Bitterroot River.

BITTERROOT RIVER BASIN  
Streamflow Forecasts - May 1, 1999

<<----- Drier ----- Future Conditions ----- Wetter ----->>								
Forecast Point	Forecast Period	90% 70%		50% (Most Probable)		30% 10%		30-Yr Avg.
		(1000AF)	(1000AF)	(1000AF)	(% AVG.)	(1000AF)	(1000AF)	(1000AF)
WF BITTERROOT nr Conner (2)	MAY-JUL	120	141	155	116	169	190	134
	MAY-SEP	130	154	170	115	186	210	148
BITTERROOT nr Derby	MAY-JUL	402	460	500	115	540	598	435
	MAY-SEP	455	515	555	115	595	655	484
COMO Reservoir Inflow	MAY-JUL	66	74	80	116	86	94	69
	MAY-SEP	70	79	85	116	91	100	73
SEALKAMO CK nr Hamilton	MAY-JUL	34	43	50	116	57	66	43
	MAY-SEP	40	51	58	116	65		50
BITTERROOT at Missoula	MAY-JUL	1160	1273	1350	117	1427	1540	1150
	MAY-SEP	1279	1399	1480	117	1561	1681	1265

BITTERROOT RIVER BASIN					BITTERROOT RIVER BASIN			
Reservoir Storage (1000 AF) - End of April					Watershed Snowpack Analysis - May 1, 1999			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	AVG			Last Yr	Average
PAINTED ROCKS LAKE	31.7	16.1	20.6	20.0	WEST FORK BITTERROOT	3	127	100
COMO	34.9	17.3	26.0	20.2	EAST SIDE BITTERROOT	5	131	108
					WEST SIDE BITTERROOT	3	230	126
					BITTERROOT RIVER BASIN	10	165	114

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

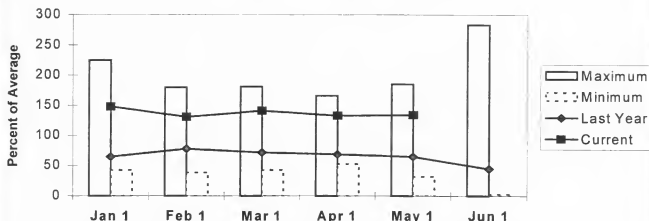
- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
 (2) - The value is natural volume - actual volume may be affected by upstream water management.



## Lower Clark Fork River Basin

Snowpack conditions in the Lower Clark Fork River Basin were well above average. Snow water content was 134 percent of average and 207 percent of last year.

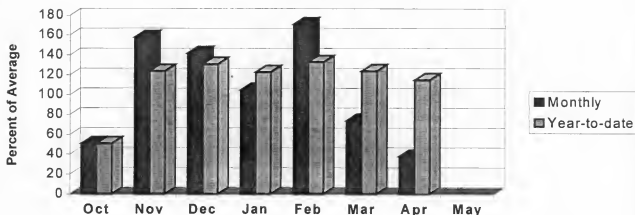
### Lower Clark Fork Snow Water Equivalent



January maximum swe was established in 1997 and minimum swe was in 1977; February maximum swe was in 1972 and minimum swe was in 1977; March maximum swe was in 1972 and minimum was in 1977; April maximum swe was in 1972 and minimum swe was in 1981; May maximum swe was in 1972 and minimum swe was in 1977; and June maximum swe was in 1974 and minimum swe was in 1977. Average is for the period 1961 through 1990.

Mountain precipitation during April was 41 percent of average and 50 percent of last year. Valley precipitation during April was 25 percent of average and 32 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 115 percent of average and 148 percent of last year.

### Lower Clark Fork Precipitation



Noxon Rapids storage was 155 percent of average and 119 percent of last year.

The Clark Fork below Missoula is forecast to reach snow melt peak flows between June 1 and June 7 with daily peak flows ranging from 30,000 cfs to 42,000 cfs or 94 percent to 131 percent of average and the Clark Fork at St. Regis is forecast to have daily peak flows ranging from 37,000 cfs to 52,000 cfs or 92 percent to 130 percent of average.

Surface Water Supply Index (SWSI) was +0.7 in the Clark Fork River below Bitterroot River and +0.6 in the Clark Fork River below Flathead River.

LOWER CLARK FORK RIVER BASIN  
Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<<----- Driser ----->>		Future Conditions		----- Wetter ----->>		30-Yr Avg. (1000AF)
		90%	70%	50% (Most Probable)		30%	10%	
		(1000AF)	(1000AF)	(1000AF)	(% AVG.)	(1000AF)	(1000AF)	
CLARK FORK abv Missoula	MAY-JUL	1161	1327	1440	114	1553	1719	1263
	MAY-SEP	1363	1540	1660	114	1780	1957	1457
CLARK FORK blw Missoula	MAY-JUL	2359	2622	2800	116	2978	3241	2413
	MAY-SEP	2672	2951	3140	115	3329	3608	2724
CLARK FORK at St. Regis (1)	MAY-JUL	2937	3421	3640	116	3859	4343	3152
	MAY-SEP	3298	3842	4090	115	4338	4882	3561
CLARK FORK nr Plains (1,2)	MAY-JUL	8679	9725	10200	113	10675	11721	9052
	MAY-SEP	9608	10772	11300	112	11828	12992	10080
THOMPSON nr Thompson Falls	MAY-JUL	141	161	175	104	189	209	169
	MAY-SEP	165	186	200	102	214	235	196
PROSPECT CREEK at Thompson Falls	MAY-JUL	95	101	105	112	109	115	94
	MAY-SEP	105	111	115	112	119	125	103
CLARK FK at Whitehorse Rpd (1,2)	MAY-JUL	9388	10634	11200	112	11766	13012	10020
	MAY-SEP	10477	11868	12500	112	13132	14523	11200

LOWER CLARK FORK RIVER BASIN  
Reservoir Storage (1000 AF) - End of April

LOWER CLARK FORK RIVER BASIN  
Watershed Snowpack Analysis - May 1, 1999

Reservoir	Usable Capacity	*** Usable Storage ***			Watershd	Number of	This Year as % of	
		This Year	Last Year	Avg		Data Sites	Last Yr	Average
NOXON RAPIDS	335.0	323.6	272.1	208.7	LOWER CLARK FORK BASIN	11	207	134

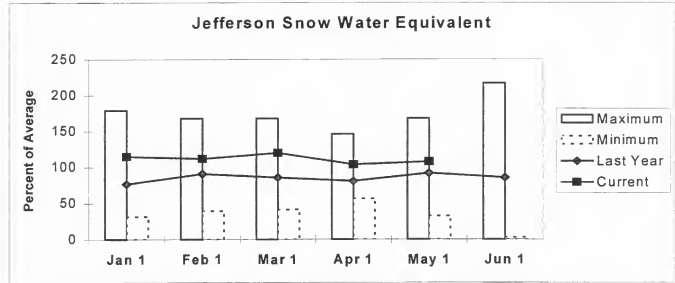
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
(2) - The value is natural volume - actual volume may be affected by upstream water management.

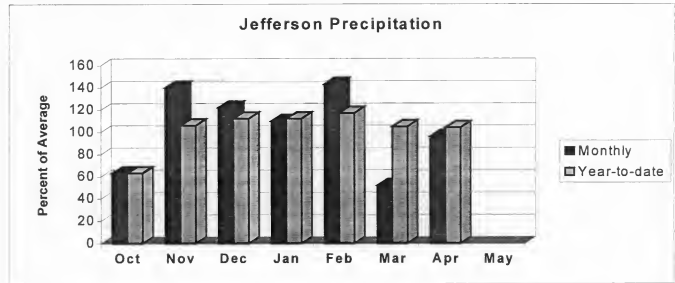
### Jefferson River Basin

Snowpack conditions in the Jefferson River Basin were near average. Snow water content was 108 percent of average and 118 percent of last year.



January maximum swe was established in 1997 and minimum swe was in 1977; February maximum swe was in 1997 and minimum was in 1977; March maximum swe was in 1972 and minimum was in 1977; April maximum swe was in 1972 and minimum was in 1977; May maximum swe was in 1975 and minimum swe was in 1977; and June maximum swe was in 1982 and minimum in 1987. Average is for the period 1961 through 1990.

Mountain precipitation during April was 95 percent of average and 80 percent of last year. Valley precipitation during April was 103 percent of average and 80 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 104 percent of average and 109 percent of last year.



Lima storage was 128 percent of average and 99 percent of last year; Clark Canyon storage was 99 percent of average and 89 percent of last year; and Ruby River storage was 104 percent of average and 100 percent of last year.

The Big Hole near Melrose is forecast to reach snow melt peak flows from May 28 to June 3 with daily peak flows ranging from 7,200 cfs to 10,300 cfs or 90 percent to 129 percent of average; the Ruby River above Ruby Reservoir is forecast to reach snow melt peak flows between May 28 and June 10 with daily peak flows ranging from 560 cfs to 980 cfs or 54 percent to 95 percent of average; the Missouri at Toston is forecast to reach peak flows between June 2 and June 8 with daily peak flow ranging from 17,500 cfs to 25,000 cfs or 92 to 131 percent of average; and inflow into Clark Canyon Reservoir is forecast to reach snow melt peak flows between May 29 and June 4 with daily peak flows ranging from 1,100 cfs to 1,950 cfs.

Surface Water Supply Index (SWSI) was +0.7 in the Beaverhead River; -0.7 in the Ruby River; +1.0 in the Big Hole River; -0.3 in the Boulder River; and +0.7 in the Jefferson River as a whole.

JEFFERSON RIVER BASIN  
Streamflow Forecasts - May 1, 1999

		<<----- Drier ----->>		Future Conditions		----->> Wetter ----->>		
Forecast Point	Forecast Period	-----		Chance Of Exceeding *		-----		30-Yr Avg. (1000AF)
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	
LIMA Reservoir Inflow (2)	MAY-JUL	49	72	87	121	102	125	72
	MAY-SEP	56	81	98	123	115	140	80
BEAVERHEAD RIVER near Grant (2)	MAY-JUL	55	89	112	122	135	170	92
	MAY-SEP	70	112	140	122	168	210	115
BEAVERHEAD RIVER at Barretts (2)	MAY-JUL	123	137	147	119	157	171	124
	MAY-SEP	162	176	185	119	194	208	155
RUBY RIVER Reservoir Inflow	MAY-JUL	53	59	62	85	66	71	73
	MAY-SEP	65	71	75	84	79	85	89
BIG HOLE RIVER near Melrose	MAY-JUL	501	599	665	120	731	829	555
	MAY-SEP	544	652	725	119	798	906	612
BOULDER RIVER near Boulder	MAY-JUL	30	53	69	92	85	108	75
	MAY-SEP	33	58	75	93	92	118	81
WILLOW CREEK Reservoir Inflow	MAY-JUL	5.8	11.7	15.6	103	19.5	25	15.1
	MAY-SEP	6.4	13.3	18.0	103	23	30	17.4
JEFFERSON RIVER near Three Forks (2)	MAY-JUL	467	644	765	102	886	1063	749
	MAY-SEP	523	718	850	101	982	1177	841

JEFFERSON RIVER BASIN Reservoir Storage (1000 AF) - End of April					JEFFERSON RIVER BASIN Watershed Snowpack Analysis - May 1, 1999			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
LIMA	84.0	70.6	71.5	55.1	BEAVERHEAD	15	116	114
CLARK CANYON	255.6	161.4	181.0	162.4	RUBY	10	104	95
RUBY RIVER	38.8	37.6	37.6	36.3	BIGHOLE	16	120	108
					BOULDER	8	98	86
					JEFFERSON RIVER BASIN	41	115	105

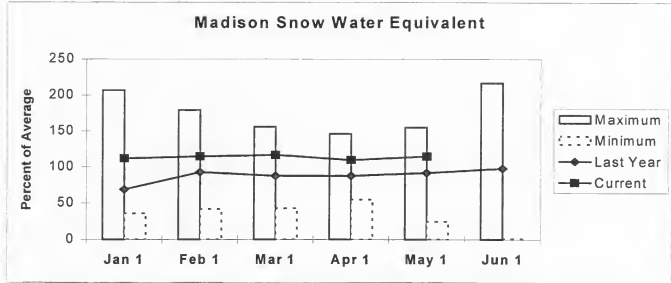
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
 (2) - The value is natural volume - actual volume may be affected by upstream water management.

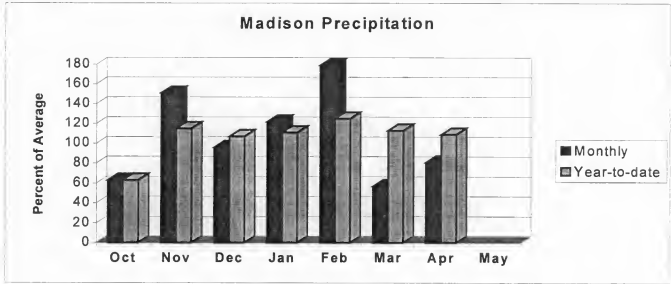
### Madison River Basin

Snowpack conditions in the Madison River Basin were above average. Snow water content was 115 percent of average and 128 percent of last year.



January maximum swe was established in 1997 and minimum swe was in 1977; February maximum swe was in 1997 and minimum was in 1977; March maximum swe was in 1997 and minimum was in 1977; April maximum swe was in 1997 and minimum was in 1977; May maximum swe was in 1997 and minimum swe was in 1977; and June maximum swe was in 1995 and minimum in 1987. Average is for the period 1961 through 1990.

Mountain and valley precipitation during April was 83 percent of average and 84 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 109 percent of average and 117 percent of last year.



Ennis Lake storage was 95 percent of average and 101 percent of last year and Hebgen Lake storage was 93 percent of average and 87 percent of last year.

Inflow into Hebgen Reservoir is forecast to reach snow melt peak flows between May 31 and June 6 with daily peak flows ranging from 3,900 cfs to 4,850 cfs or 113 to 141 percent of average.

Surface Water Supply Index (SWSI) was +0.3 for the Madison River.

MADISON RIVER BASIN  
Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<<----- Drier ----- Future Conditions ----- Wetter ----->>		Chances Of Exceeding *				
		90%	70%	50% (Most Probable)		30%	10%	30-Yr Avg.
		(1000AF)	(1000AF)	(1000AF) (% AVG.)		(1000AF)	(1000AF)	(1000AF)
HEBGEN LAKE Inflow	MAY-JUL	349	382	405	126	428	461	321
	MAY-SEP	468	508	535	125	562	602	428
ENNIS LAKE Inflow (2)	MAY-JUL	533	582	615	109	648	697	562
	MAY-SEP	683	744	785	107	826	887	731

MADISON RIVER BASIN Reservoir Storage (1000 AF) - End of April				MADISON RIVER BASIN Watershed Snowpack Analysis - May 1, 1999			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of Last Yr Average
		This Year	Last Year	Avg			
ENNIS LAKE	41.0	33.2	32.8	35.1	MADISON abv HEBGEN LAKE	6	150
HEBGEN LAKE	377.5	229.2	264.5	246.1	MADISON b/w HEBGEN LAKE	12	112
					MADISON RIVER BASIN	18	125

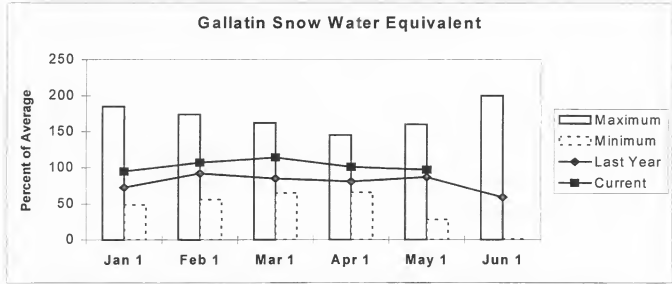
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
 (2) - The value is natural volume - actual volume may be affected by upstream water management.

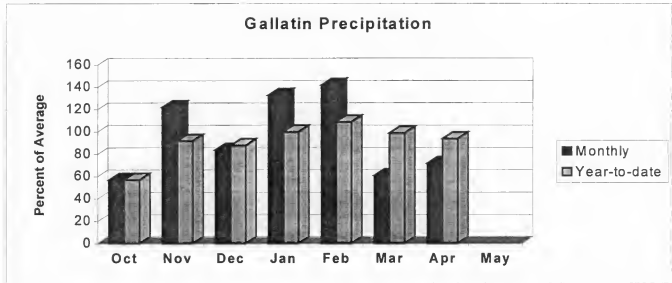
### Gallatin River Basin

Snowpack conditions in the Gallatin River Basin were near average. Snow water content was 97 percent of average and 112 percent of last year.



January maximum swe was established in 1997 and minimum swe was in 1966; February maximum swe was in 1997 and minimum was in 1981; March maximum swe was in 1997 and minimum was in 1977 and 1987; April maximum swe was in 1997 and minimum was in 1987; May maximum swe was in 1970 and minimum swe was in 1987; and June maximum swe was in 1975 and minimum in 1987. Average is for the period 1961 through 1990.

Mountain precipitation during April was 71 percent of average and 75 percent of last year. Valley precipitation during April was 74 percent of average and 130 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 94 percent of average and 112 percent of last year.



Middle Creek storage was 165 percent of average and 104 percent of last year.

The Gallatin River near Gateway is forecast to reach snow melt peak flows between June 3 and June 9 with daily peak flows ranging from 4,700 cfs to 5,900 cfs or 87 to 109 percent of average and the Gallatin River near Logan is forecast to reach snow melt peak flows between June 3 and June 9 with daily peak flows ranging from 4,100 cfs to 5,900 cfs or 73 to 106 percent of average.

Surface Water Supply Index (SWSI) was -0.6 for the Gallatin River.

GALLATIN RIVER BASIN  
Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<<----- Drier ----- Future Conditions ----- Wetter ----->>					
		Chance Of Exceeding *		30%		10%	
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF) (% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
GALLATIN RIVER near Gateway	MAY-JUL	373	407	430	105	453	487
	MAY-SEP	441	482	510	105	538	579
HYALITE Reservoir Inflow	MAY-JUL	14.9	17.2	18.8	90	20	23
	MAY-SEP	17.4	19.9	22	86	23	26
HYALITE CREEK nr Boreman (2)	MAY-JUL	22	27	30	91	33	38
	MAY-SEP	26	32	35	90	39	44
GALLATIN RIVER at Logan (2)	MAY-JUL	264	339	390	91	441	516
	MAY-SEP	318	406	465	91	524	612

GALLATIN RIVER BASIN Reservoir Storage (1000 AF) - End of April					GALLATIN RIVER BASIN Watershed Snowpack Analysis - May 1, 1999			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershad	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
		Year	Year					
MIDDLE CREEK	10.2	7.9	7.6	4.8	UPPER GALLATIN	7	114	100
					HYALITE	3	106	88
					BRIDGER	3	112	96
					GALLATIN RIVER BASIN	13	112	97

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

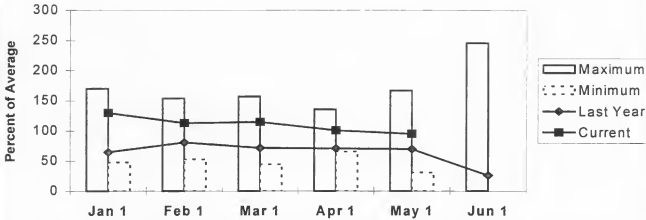
- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
 (2) - The value is natural volume - actual volume may be affected by upstream water management.



### Missouri Mainstem River Basin

Snowpack conditions in the Headwaters Missouri Mainstem River Basin were near average. Snow water content was 95 percent of average and 142 percent of last year.

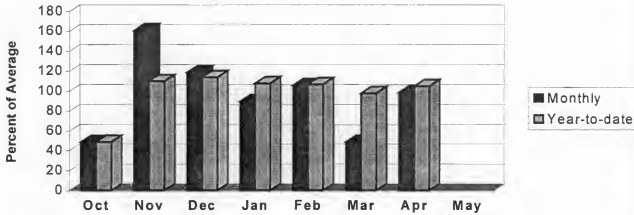
Headwaters Mainstem Snow Water Equivalent



January maximum swe was established in 1997 and minimum swe in 1977; February maximum swe was in 1972 and minimum swe was in 1977; March maximum swe in 1972 and minimum swe was in 1977; April maximum swe was in 1972 and minimum swe was in 1961; May maximum swe was in 1975 and minimum swe was in 1977; and June maximum swe was in 1982 and minimum swe was in 1992. Average is for the period 1961 through 1990.

Mountain precipitation during April was 83 percent of average and 105 percent of last year. Valley precipitation during April was 99 percent of average and 136 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 96 percent of average and 120 percent of last year.

Headwaters Mainstem Precipitation



Canyon Ferry Lake storage was 91 percent of average and 86 percent of last year; Helena Valley storage was 115 percent of average and 99 percent of last year; Lake Helena storage was 108 percent of average and the same as last year; Hauser & Helena storage was 104 percent of average and the same as last year; Holter Lake storage was 109 percent of average and the same as last year; and Fort Peck Lake storage was 103 percent of average and 99 percent of last year.

Surface Water Supply Index (SWSI) was +0.3 in the Missouri River above Canyon Ferry; -0.2 in the Missouri River below Canyon Ferry; +0.1 in the Missouri River above Fort Peck; and +0.3 in the Missouri River below Fort Peck.

MISSOURI MAINSTEM RIVER BASIN  
Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<<----- Drier ----->>		Future Conditions		----- Wetter ----->>		30-Yr Avg. (1000AF)
		90%	70%	50% (Most Probable)		30%	10%	
		(1000AF)	(1000AF)	(1000AF)	(% AVG.)	(1000AF)	(1000AF)	
MISSOURI RIVER at Toston (2)	MAY-JUL	1301	1682	1940	112	2198	2579	1730
	MAY-SEP	1822	2011	2320	112	2629	2817	2071
PRICKLY PEAR CREEK near Clancy	MAY-JUL	3.4	11.4	16.8	84	22	30	20
	MAY-SEP	4.9	14.1	20	85	27	36	24
GIBSON Reservoir Inflow	MAY-JUL	354	414	455	103	496	556	441
	MAY-SEP	390	456	500	102	544	610	489
MISSOURI RIVER at Fort Benton (2)	MAY-JUL	1729	2435	2915	112	3395	4101	2597
	MAY-SEP	2614	3031	3550	111	4069	4495	3188
MARIAS RIVER near Shelby (2)	MAY-JUL	375	440	485	125	530	595	387
	MAY-SEP	421	486	530	124	574	639	428
MISSOURI RIVER at Virgelle (2)	MAY-JUL	2320	3100	3630	120	4160	4940	3030
	MAY-SEP	3141	3748	4340	119	4932	5588	3652
MISSOURI RIVER near Landueky (2)	MAY-JUL	2724	3511	4045	123	4579	5366	3279
	MAY-SEP	3487	4242	4821	122	5400	6260	3962
MISSOURI RIVER below Fort Peck (2)	MAY-JUL	2508	3420	4040	121	4660	5572	3327
	MAY-SEP	3214	4077	4750	126	5423	6050	3781
LAKE SAKAKAWEA Inflow (2)	MAY-JUL	7964	9879	11180	136	12481	14396	8209
	MAY-SEP	10237	11684	13040	135	14396	16032	9658

MISSOURI MAINSTEM RIVER BASIN Reservoir Storage (1000 AF) - End of April					MISSOURI MAINSTEM RIVER BASIN Watershed Snowpack Analysis - May 1, 1999			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Date Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
CANYON FERRY LAKE	2043.0	1359.0	1581.0	1501.0	HEADWATERS MAINSTEM	10	142	95
HELENA VALLEY	9.2	8.6	8.7	7.5	SMITH-JUDITH-MUSSELSHELL	12	143	87
LAKE HELENA	10.4	10.9	10.9	10.1	SUN-TETON-MARIAS	14	321	121
HAUSER & HELENA	61.9	63.0	63.1	60.4	MAINSTEM ab FT PECK RES	35	204	104
HOLTER LAKE	81.9	80.5	80.8	73.9	MILK RIVER BASIN	4	0	73
FORT PECK LAKE (MAF)	18.9	15.4	15.5	15.0	MISSOURI MAINSTEM BASIN	38	202	103

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

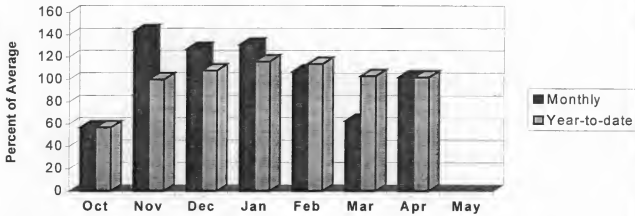
The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
 (2) - The value is natural volume - actual volume may be affected by upstream water management.

### Smith-Judith-Musselshell River Basins

Snowpack conditions in the Smith-Judith-Musselshell River Basins were below average. Snow water content in the Smith River Basin was 111 percent of average and 147 percent of last year; in the Judith River Basin was 87 percent of average and 148 percent of last year; and in the Musselshell Basin River was 82 percent of average and 123 percent of last year.

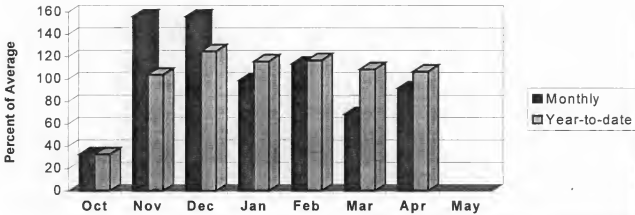
Smith-Judith-Musselshell Precipitation



January maximum swe was established in 1997 and minimum swe in 1988; February maximum swe was in 1978 and minimum swe was in 1987; March maximum swe was in 1978 and minimum swe was in 1987; April maximum swe was in 1970 and minimum swe was in 1992; and May maximum swe was in 1970 and minimum swe was in 1987; and June maximum swe was in 1982 and minimum swe was in 1992. Average is for the period 1961 through 1990.

Mountain and valley precipitation during April in the Smith-Belts was 87 percent of average and 99 percent of last year; in the Judith was 110 percent of average and 143 percent of last year; and in the Musselshell was 112 percent of average and 84 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 102 percent of average and 127 percent of last year.

Sun-Teton-Marias Precipitation



Smith River storage was 109 percent of average and 87 percent of last year; Newlan Creek storage was 99 percent of average and 87 percent of last year; Bair storage was 83 percent of average and 84 percent of last year; Martinsdale storage was 118 percent of average and 70 percent of last year; and Deadman's Basin was 120 percent of average and 94 percent of last year.

Sheep Creek near White Sulphur Springs is forecast to reach snow melt peak flows between May 19 and May 26 with daily peak flows ranging from 160 cfs to 235 cfs or 75 to 111 percent of average; and the Smith River at Fort Logan is forecast to reach snow melt peak flows between June 6 and June 12.

Surface Water Supply Index (SWSI) was +0.9 in the Smith River and +0.7 in the Musselshell River.

SMITH-JUDITH-MUSSELSHELL RIVER BASINS  
Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<<----- Drier ----->>		Future Conditions		----- Wetter ----->>		30-Yr Avg. (1000AF)
		90%	70%	50% (Most Probable)		30%	10%	
		(1000AF)	(1000AF)	(1000AF)	(% AVG.)	(1000AF)	(1000AF)	
SHEEP CREEK nr White Sulphur Springs	MAY-JUL	12.9	15.3	16.9	104	18.5	21	16.3
	MAY-SEP	15.1	18.0	20	104	22	25	19.2
SMITH RIVER near Fort Logan (D)	MAY-JUL	23	41	54	102	67	85	53
	MAY-SEP	30	52	66	103	80	102	64
NF MUSSELSHELL near Dalpina	MAY-JUL	1.99	3.25	4.10	108	4.95	6.21	3.80
	MAY-SEP	2.50	3.99	5.00	109	6.01	7.50	4.60
SF MUSSELSHELL abv Martinsdale	MAY-JUL	17.6	37	50	109	63	82	46
	MAY-SEP	20	40	54	108	68	88	50

SMITH-JUDITH-MUSSELSHELL RIVER BASINS  
Reservoir Storage (1000 AF) - End of April

SMITH-JUDITH-MUSSELSHELL RIVER BASINS  
Watershed Snowpack Analysis - May 1, 1999

Reservoir	Usable Capacity	*** Usable Storage ***				Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg				Last Yr	Average
SMITH RIVER	10.6	9.9	11.4	9.1	SMITH	6	136		98
NEWMAN CREEK	12.4	8.7	10.0	8.8	JUDITH	6	148		87
BAIR	7.0	4.8	5.7	5.8	MUSSELSHELL	5	123		77
MARTINSDALE	23.1	14.6	20.8	12.4	SMITH-JUDITH-MUSSELSHELL	12	143		87
DEADMAN'S BASIN	72.2	65.5	69.8	54.4					

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volume in the table.

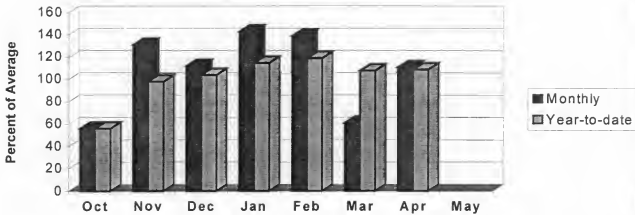
The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.

### Sun-Teton-Marias River Basins

Snowpack conditions in the Sun-Teton-Marias River Basins were above average. Snow water content in the Sun River Basin was 107 percent of average and 255 percent of last year; in the Teton River Basin was 140 percent of average and 414 percent of last year; and in the Marias River Basin was 126 percent of average and 356 percent of last year.

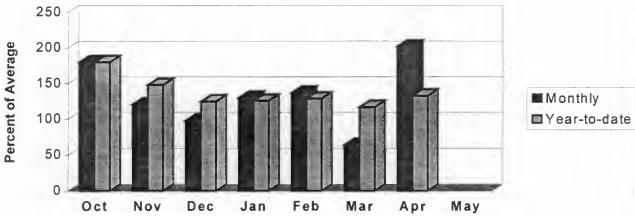
Upper Yellowstone Precipitation



January maximum swe was established in 1997 and minimum swe was in 1988; February maximum swe was in 1972 and minimum swe was in 1977; March maximum swe was in 1972 and minimum swe was in 1984; April maximum swe was in 1972 and minimum swe was in 1984; May maximum swe was in 1972 and minimum swe was in 1977; and June maximum was in 1982 and minimum swe was in 1992. Average is for the period 1961 through 1990.

Mountain and valley precipitation during April in the Sun was 109 percent of average and 112 percent of last year; in the Teton was 83 percent of average and 121 percent of last year; and in the Marias was 91 percent of average and 109 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 107 percent of average and 151 percent of last year.

Lower Yellowstone Precipitation



Gibson storage was 105 percent of average and 98 percent of last year; Pishkun storage was 103 percent of average and 99 percent of last year; Willow Creek storage was 91 percent of average and 72 percent of last year; Lower Two Medicine Lake storage was 131 percent of average and 93 percent of last year; Four Horns Lake storage was 299 percent of average and 351 percent of last year; Swift storage was 58 percent of average and 47 percent of last year; Lake Frances storage was 79 percent of average and 80 percent of last year; and Lake Elwell (Tiber) storage was 112 percent of average and 90 percent of last year.

Inflow into Gibson Reservoir is forecast to reach snow melt peak flows between June 2 and June 10 with daily peak flows ranging from 6,600 cfs to 8,300 cfs; inflow into Swift Reservoir is forecast to reach snow melt peak flows between June 4 and June 10 with daily peak flows ranging from 790 cfs to 1,080 cfs.

Surface Water Supply Index (SWSI) was +0.1 in the Sun River; +0.8 in the Teton River; +1.7 in the Birch/Dupuyer Creeks; and +1.9 in the Marias River.

SUN-TETON-MARIAS RIVER BASINS  
Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<<----- Drier ----->>		Future Conditions		----- Wetter ----->>		30-Yr Avg. (1000AF)
		90%	70%	Chance Of Exceeding *		30%	10%	
		(1000AF)	(1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	(1000AF)	(1000AF)	
GIBSON Reservoir Inflow	MAY-JUL	354	414	455	103	496	556	441
	MAY-SEP	390	456	500	102	544	610	489
TWO MEDICINE RIVER nr Browning (2)	MAY-JUL	171	209	235	126	261	299	187
	MAY-SEP	181	219	245	123	271	309	200
BADGER CREEK near Browning (2)	MAY-JUL	83	102	115	124	128	147	93
	MAY-SEP	101	121	135	123	149	169	110
SWIFT Reservoir Inflow	MAY-JUL	49	64	74	121	84	99	61
	MAY-SEP	61	77	88	121	99	115	73
DUFOYER CREEK near Valier	MAY-JUL	1.4	10.2	16.2	124	22	31	13.1
	MAY-SEP	2.6	12.0	18.4	123	25	34	15.0
CUT BANK CREEK at Cut Bank	MAY-JUL	73	86	94	125	102	115	75
	MAY-SEP	82	96	105	125	114	128	84
MARIAS RIVER near Shelby (2)	MAY-JUL	375	440	485	125	530	595	387
	MAY-SEP	421	486	530	124	574	639	428

SUN-TETON-MARIAS RIVER BASINS					SUN-TETON-MARIAS RIVER BASINS			
Reservoir Storage (1000 AF) - End of April					Watershed Snowpack Analysis - May 1, 1999			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
GIBSON	99.1	60.0	61.5	57.2	SUN	7	255	107
PISHKUN	32.0	26.2	26.4	25.4	TETON	4	414	140
WILLOW CREEK	32.2	22.4	31.2	24.6	MARIAS	6	356	126
LOWER TWO MEDICINE LAKE	11.9	11.7	12.6	8.9	SUN-TETON-MARIAS	14	321	121
FOUR HORNS LAKE	19.2	38.3	10.9	12.8				
SWIFT	30.0	10.6	22.6	18.3				
LAKE FRANCES	112.0	61.5	76.8	77.6				
LAKE ELMWELL (TIBER)	1347.0	687.2	765.3	611.4				

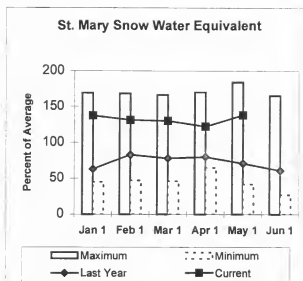
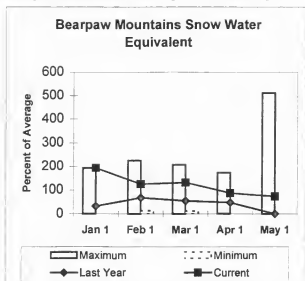
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
 (2) - The value is natural volume - actual volume may be affected by upstream water management.

## St. Mary and Milk River Basins

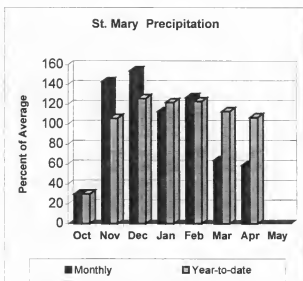
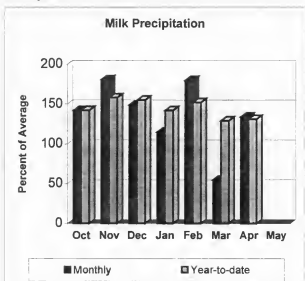
Snowpack conditions in the St. Mary and Milk River Basins were well above average. Snow water content in the Saint Mary River Basin was 138 percent of average and 196 percent of last year. The Milk River Basin (Bearpaw Mountains) was 73 percent of average.



Bearpaw - January maximum swe was established in 1978 and minimum swe was in 1981; February maximum swe was 1978 and minimum was in 1973; March maximum swe was 1978 and minimum swe was 1981; April maximum swe was in 1975 and minimum swe was in 1983; May maximum swe was 1975 and the minimum has occurred in several years. Average is for the period 1961 through 1990.

St. Mary - January maximum swe was established in 1997 and minimum swe was in 1988; February maximum swe was 1978 and minimum swe was in 1977; March maximum swe was in 1972 and minimum swe was in 1977; April maximum swe was in 1972 and minimum swe was in 1992; May maximum swe was in 1972 and minimum swe was in 1977; and June maximum swe was in 1991 and minimum swe was 1992. Average is for the period 1961 through 1990.

Mountain and valley precipitation in the St. Mary River Basin during April was 59 percent of average and 90 percent of last year; and in the Milk River Basin during April was 134 percent of average and 126 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 118 percent of average and 141 percent of last year.



Lake Sherburne storage was 50 percent of average and 125 percent of last year; Fresno storage was 61 percent of average and 71 percent of last year; Beaver Creek storage was 132 percent of average and 122 percent of last year; and Nelson storage was 107 percent of average and 100 percent of last year.

Surface Water Supply Index (SWSI) was -0.3 for the Milk River.

ST. MARY and MILK RIVER BASINS  
Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<<----- Drier ----->>				Future Conditions		----- Wetter ----->>		30-Yr Avg. (1000AF)
		Chance Of Exceeding *								
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)			
LAKE SHERBURNE Inflow	MAY-JUL	90	98	104	106	110	118			98
	MAY-SEP	104	114	120	104	126	136			115
ST. MARY RIVER near Babb	MAY-JUL	345	378	400	108	422	455			371
	MAY-SEP	409	448	475	108	502	541			439
ST. MARY RIVER at US/CAN Border (2)	MAY-JUL	406	450	480	112	510	554			429
	MAY-SEP	478	530	565	112	600	652			506
MILK RIVER at Western Crossing	MAY-JUL	14.2	24	30	120	36	46			25
	MAY-SEP	14.9	26	33	122	40	51			27
MILK RIVER at Eastern Crossing (2)	MAY-JUL	19.3	32	40	111	48	61			36
	MAY-SEP	33	43	50	111	57	67			45
BEAVER CREEK Reservoir Inflow	MAY-JUL	2.25	5.67	8.00	103	10.33	13.75			7.80

ST. MARY and MILK RIVER BASINS  
Reservoir Storage (1000 AF) - End of April

ST. MARY and MILK RIVER BASINS  
Watershed Snowpack Analysis - May 1, 1999

Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Date Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
LAKE SHERBURNE	64.3	10.4	8.3	20.8	ST. MARY	8	196	138
FRESNO	127.0	58.0	82.2	95.8	BEARPAW MOUNTAINS	4	0	73
BEAVER CREEK	3.5	3.3	2.7	2.5	CYPRESS HILLS, CANADA	0	0	0
NELSON	66.8	45.5	45.3	42.7	MILK RIVER BASIN	4	0	73
					ST. MARY & MILK BASINS	12	198	136

\* 90%, 70%, 30%, and 10% chance of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

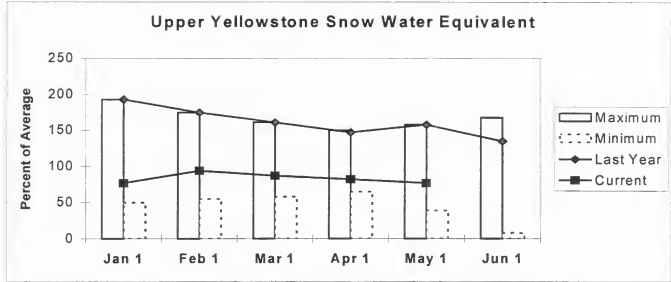
The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
(2) - The value is natural volume - actual volume may be effected by upstream water management.



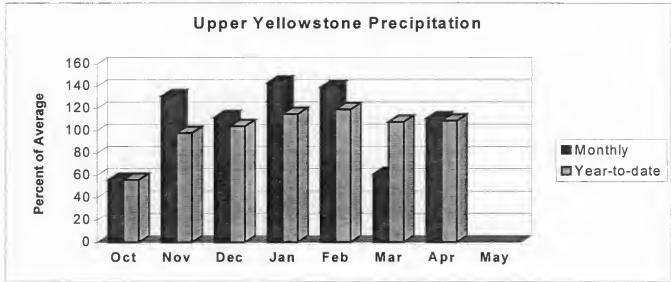
### Upper Yellowstone River Basin

Snowpack conditions in the Upper Yellowstone River Basin were above average. Snow water content was 110 percent of average and 143 percent of last year.



January maximum swe was established in 1997 and minimum swe was in 1988; February maximum swe was in 1997 and minimum swe was in 1977; March maximum swe was in 1997 and minimum swe was in 1971 and minimum swe was in 1981; May maximum swe was in 1997 and minimum swe was in 1987; and June maximum swe was 1982 and minimum swe was in 1987 and 1994. Average is for the period 1961 through 1990.

Mountain precipitation during April was 110 percent of average and 149 percent of last year. Valley precipitation during April was 122 percent of average and 189 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 109 percent of average and 125 percent of last year.



Mystic Lake storage was 37 percent of average and 233 percent of last year and Cooney storage was 110 percent of average and 88 percent of last year.

The Yellowstone River at Corwin Springs is forecast to reach snow melt peak flows between June 8 and June 16 with daily peak flows ranging from 18,500 cfs to 24,500 cfs or 105 percent to 140 percent of average; the Yellowstone at Livingston is forecast to reach snow melt peak flows between June 8 and June 16 with daily peak flows ranging from 21,000 cfs to 27,500 cfs or 102 percent to 133 of average; the Boulder near Big Timber is forecast to reach snow melt peak flows between June 8 and June 16 with daily peak flows ranging from 4,300 cfs to 6,300 cfs or 82 to 121 percent of average; the Stillwater near Absarokee is forecast to reach peak flows between June 8 and June 16 with daily peak flows ranging from 4,800 cfs to 7,500 cfs or 73 to 114 percent of average; the Clarks Fork near Belfry is forecast to reach snow melt peak flows between June 8 and June 16 with daily peak flows ranging from 6,500 cfs to 9,200 cfs or 84 to 119 percent of average; the Yellowstone at Billings is forecast to reach snow melt peak flows between June 8 and June 16 with daily peak flows ranging from 36,000 cfs to 50,500 cfs or 84 to 118 percent of average.

Surface Water Supply Index (SWSI) was +2.0 in the Yellowstone River above Livingston; -0.9 in the Shields River; +0.4 in the Boulder River; +0.4 in the Stillwater River; -0.5 in the Rock/Red lodge Creeks; +0.4 in the Clarks Fork River; and +1.3 in the Yellowstone River above Bighorn River.

UPPER YELLOWSTONE RIVER BASIN  
Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<<----- Drier ----->>		Future Conditions		----- Wetter ----->>		30-Yr Avg. (1000AF)
		90%	70%	Chance Of Exceeding *		30%	10%	
		(1000AF)	(1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	(1000AF)	(1000AF)	
YELLOWSTONE at Lake Outlet	MAY-JUL	586	639	675	126	711	764	538
	MAY-SEP	843	898	935	124	972	1027	756
YELLOWSTONE RIVER at Corwin Spgs.	MAY-JUL	1727	1815	1875	124	1935	2023	1516
	MAY-SEP	2115	2201	2260	123	2319	2405	1844
YELLOWSTONE RIVER near Livingston	MAY-JUL	1984	2095	2170	125	2245	2356	1737
	MAY-SEP	2391	2527	2620	123	2713	2849	2123
SHIELDS RIVER nr Livingston	MAY-JUL	39	80	108	81	136	177	134
	MAY-SEP	43	91	124	82	157	205	151
BOULDER RIVER at Big Timber	MAY-JUL	275	305	325	101	345	375	322
	MAY-SEP	302	334	355	101	376	408	350
MYSTIC LAKE Reservoir Inflow (2)	MAY-JUL	52	58	62	103	66	72	60
	MAY-SEP	69	75	80	104	85	91	77
STILLWATER RIVER nr Absarokee (2)	MAY-JUL	375	429	465	98	501	555	474
	MAY-SEP	459	516	555	98	594	651	569
CLARK'S FORK RIVER nr Belfry	MAY-JUL	461	508	540	106	572	619	508
	MAY-SEP	511	561	595	105	629	679	566
COONEY Reservoir Inflow (2)	MAY-JUL	14.9	29	38	100	47	61	38
	MAY-SEP	26	40	49	100	58	72	49
YELLOWSTONE RIVER at Billings (2)	MAY-JUL	3301	3747	4050	122	4353	4799	3320
	MAY-SEP	4000	4482	4810	122	5138	5620	3954

UPPER YELLOWSTONE RIVER BASIN Reservoir Storage (1000 AF) - End of April					UPPER YELLOWSTONE RIVER BASIN Watershed Snowpack Analysis - May 1, 1999		
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number Of Data Sites	This Year as % of Last Yr Average
		This Year	Last Year	Avg			
MYSTIC LAKE	21.0	0.7	0.3	1.9	YELLOWSTONE ab LIVINGSTON	15	141
COONEY	27.4	21.3	24.1	19.4	SHIELDS	5	119
					BOULDER-STILLWATER	4	158
					CLARK'S FORK-ROCK CREEK	12	152
					UPPER YELLOWSTONE BASIN	32	143

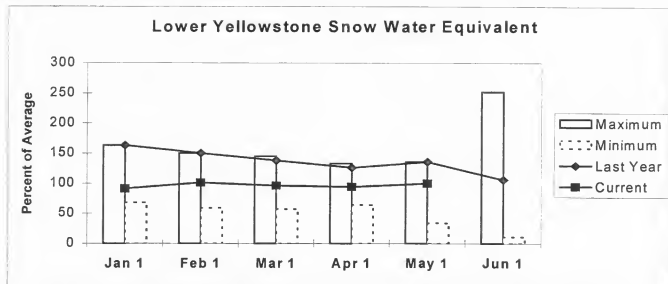
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
 (2) - The value is natural volume - actual volume may be affected by upstream water management.

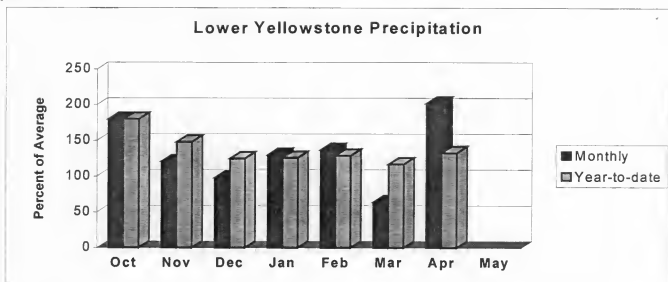
## Lower Yellowstone River Basin

Snowpack conditions in the Lower Yellowstone River Basin, in Wyoming, were near average. Snow water content was 125 percent of average and 123 percent of last year.



January maximum swe was established in 1997 and minimum swe was in 1981; February maximum swe was in 1997 and minimum swe was in 1981; March maximum swe was in 1986 and minimum swe was in 1977; April maximum swe was in 1986 and minimum swe was in 1981; May maximum swe was in 1997 and minimum swe was in 1981; and June maximum swe was in 1995 and minimum swe was in 1994. Average is for the period 1961 through 1990.

Mountain and valley precipitation during April was 202 percent of average and 196 percent of last year. Mountain and valley water year precipitation, beginning October 1, 1998, was 133 percent of average and 129 percent of last year.



Bighorn Lake storage was 98 percent of average and 93 percent of last year and Tongue River storage was 75 percent of average and 273 percent of last year.

Surface Water Supply Index (SWSI) was +2.7 in the Bighorn River below Bighorn Lake; -0.6 in the Little Bighorn River; +1.9 in the Yellowstone River below Bighorn River; -0.5 in the Tongue River; and +0.1 in the Powder River.

LOWER YELLOWSTONE RIVER BASIN  
Streamflow Forecasts - May 1, 1999

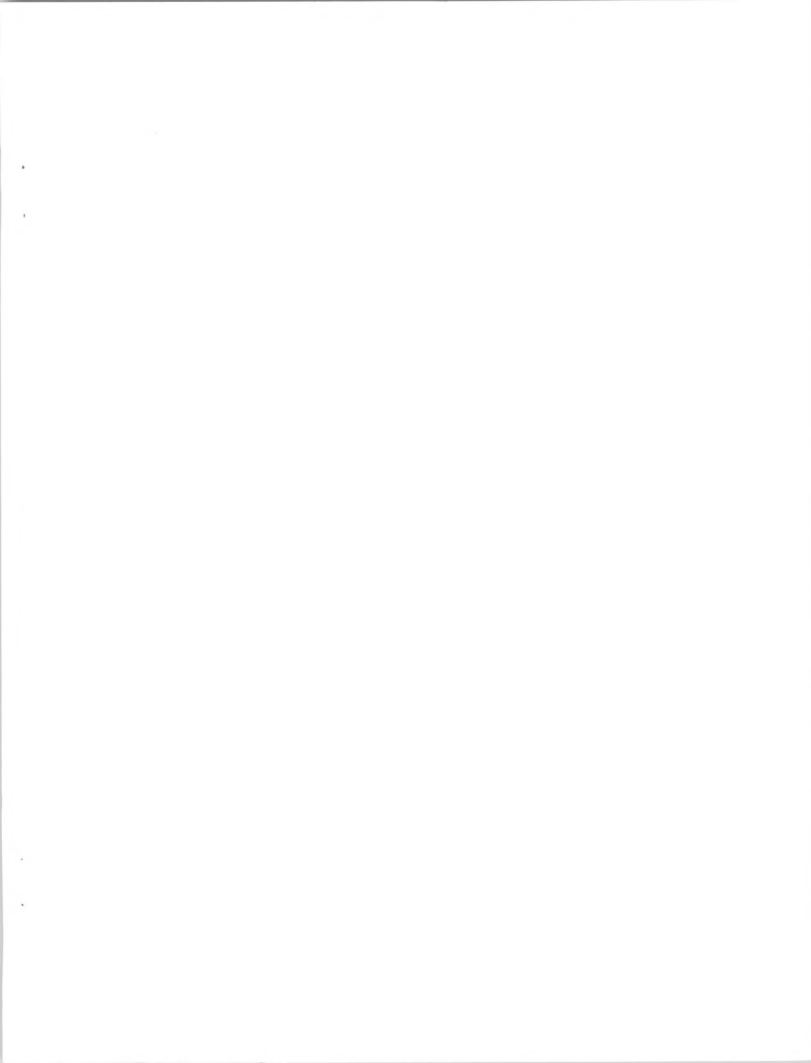
		<<----- Drier ----- Future Conditions ----- Wetter ----->>						
Forecast Point	Forecast Period	Chance Of Exceeding *						
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)	30-Yr Avg. (1000AF)
YELLOWSTONE RIVER at Billings (2)	MAY-JUL	3301	3747	4050	122	4353	4799	3320
	MAY-SEP	4000	4482	4810	122	5138	5620	3954
BIGHORN RIVER nr St. Xavier (2)	MAY-JUL	1726	1922	2055	136	2188	2384	1508
	MAY-SEP	1951	2147	2280	136	2413	2609	1673
LITTLE BIGHORN RIVER nr Hardin	MAY-JUL	47	74	92	78	110	137	118
	MAY-SEP	57	86	106	79	126	155	135
TONGUE RIVER Reservoir Inflow (2)	MAY-JUL	120	165	195	94	225	270	208
	MAY-SEP	135	183	215	95	247	295	227
YELLOWSTONE RIVER at Miles City (2)	MAY-JUL	4782	5626	6200	125	6774	7618	4957
	MAY-SEP	6302	6769	7400	127	8031	8519	5835
POWDER RIVER at Moorehead	MAY-JUL	92	154	196	108	238	300	182
	MAY-SEP	114	177	220	108	263	326	204
POWDER RIVER near Locate	MAY-JUL	137	181	210	100	239	283	211
	MAY-SEP	136	194	233	100	272	330	234
YELLOWSTONE RIVER nr Sidney (2)	MAY-JUL	4797	6049	6900	128	7751	9003	5383
	MAY-SEP	6644	7005	8043	128	9081	9527	6268

LOWER YELLOWSTONE RIVER BASIN Reservoir Storage (1000 AF) - End of April					LOWER YELLOWSTONE RIVER BASIN Watershed Snowpack Analysis - May 1, 1999			
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
BIGHORN LAKE	1356.0	771.3	830.7	789.2	WIND RIVER (Wyoming)	19	141	157
TONGUE RIVER	68.0	27.3	10.0	36.6	SHOSHONE RIVER (Wyoming)	7	149	127
					BIGHORN RIVER (Wyoming)	21	123	117
					LITTLE BIGHORN (Wyoming)	3	96	89
					TONGUE RIVER (Wyoming)	9	102	98
					POWDER RIVER (Wyoming)	9	95	105
					LOWER YELLOWSTONE BASIN	47	123	125

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual volume will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural volume - actual volume may be affected by upstream water management.





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Natural Resources Conservation Service  
Bozeman, MT

